Developing a Pathway Towards Resilience for Adolescents Experiencing Homelessness Using Complexity Science

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Abstract

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Approximately 3.5 million American youth aged 18-24 have experienced some form of explicit homelessness and/or couch surfing without safe and stable housing in the past year, and these youth are at high risk of exposure to physical and mental health problems, early pregnancy, substance use, and early death (Morton et al., 2018). Although homelessness increases the risks of adverse outcomes, effects are not universal and differ between youths; meaning some youth are able to adapt to this adversity and have higher levels of life satisfaction and better overall outcomes (Buckner, 2008; Rew et al., 2019). The development of positive outcomes in the face of adversity is resilience (Masten, 2001). There is a growing recognition that social connectedness is an important part of the complex reality of adolescent homelessness (Dang, 2014). This study is a secondary analysis of data from An Intervention to Promote Responsible Health Behaviors in Homeless Youths [R01 HD083576] funded by the National Institute of Child Health and Human Development/National Institutes of Health. The diverse sample included 269

adolescents 18-24 years of age: 155 from Columbus, Ohio and 111 from Austin, Texas; 58% male; 65% Latino/Hispanic, and; 30% identified as having an alternate sexual orientation. Of the adversities of homelessness studied, 44% of youth experienced sexual abuse, 28% of youth experienced parental abuse, 31% of youth experienced parental neglect, and 11% experienced death of a parent. Linear regression analysis of the adversities of homelessness (sexual abuse, parental abuse, parental neglect, death of a parent and duration of homelessness), social connectedness, psychological capital (hope, optimism, future time perspective) and resilience was statistically significant: F (26, 217) = 10.25, $p < .001$. The study tested a pathway model of resilience to explore the role of social connectedness as a mediator in the relationship between homelessness and resilience. Mediation analysis using R package and bootstrapping for variance estimation showed no statistically significant mediation of the relationship between adversity and resilience. Additional mediation analyses showed statistically significant mediation relationships among variables comprising the construct of psychological capital (hope, optimism, future time perspective) and resilience in this population of youth experiencing homelessness (all $p < 0.001$). These findings provide a more complete view of the role of social connectedness in the lives of youth experiencing homelessness and have implications for nursing practice, further research and policy that addresses their strengths as well as their complex health care needs.

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Chapter 1: Introduction

According to a recent study, approximately 3.5 million American youth aged 18-24 have experienced some form of explicit homelessness and/or couch surfing without safe and stable housing in the past year (Morton et al., 2018). Homelessness is defined as living "in a shelter or on the street or living independently because they had run away, been pushed out, or drifted out of their family of origin" (Haldenby et al., 2007, p.1232). These youth are at high risk of exposure to physical and mental health problems, early pregnancy, substance use, and early death (Morton et al., 2018). According to the Centers for Disease Control and Prevention's (CDC) Youth Risk Behavior Surveillance System (YRBSS), youth experiencing homelessness have a higher risk of being in a gang, using heroin, feeling depressed, attempting suicide, or experiencing trauma and violence than their housed counterparts (2019). Homelessness represents a potential accumulation of adversities beyond lack of housing related to the lack of education, job skills and social skills and fragmented family relationships. Fundamentally, adolescents experiencing homelessness are a vulnerable population who benefit from systemic support to adapt to and overcome adversity.

Youth 18-24 years of age who are experiencing homelessness are vulnerable to multiple threats because of the complex realities of street life. Although risk is abundant with this population, research has also identified protective factors embedded in their environment (Kidd & Shahar, 2008). Many of these youth report having internal assets like positive values and life perspectives, individual strengths and social competencies (Thompson et al., 2016) that are associated with lower levels of distress, more positive health behavior, and greater life satisfaction and resilience (Heinze, 2013; Thompson et al., 2016). There is a growing recognition that social connectedness is an important part of the

complex reality of adolescent homelessness (Dang, 2014). Therefore, understanding more about the relationships between homelessness, resilience and social connectedness would benefit this population and extend the knowledge base to other populations of adolescents.

Most of these adolescents experiencing homelessness are experiencing family conflict or breakdown (Kidd & Davidson, 2009; Rosenthal et al., 2006) of some type and have limited access to the traditional support structures (e.g. family, school, faith). This population experiences risk factors related to street life including not having their basic shelter needs met, poor access to healthcare, untreated mental health disorders, substance use, sexually transmitted diseases and HIV infection, sexual exploitation (including survival sex to meet basic needs), physical victimization and suicide (Bassuk et al., 2015), in addition to structural and economic hurdles (Christiani et al., 2008; Zlotnick & Zerger, 2009). These conditions create the context in which this population also experiences abnormally high rates of mental illness, suicide ideation, attempted and completed suicide experienced by members of this population (Desai et al., 2003; Kamieniecki, 2001; Moore, 2005). The interaction between risk factors, structural barriers and psychiatric distress demonstrates the complexity of the dilemma and has the potential to make it difficult to manage everyday life and ultimately increase costs for the public (Chamberlain & Johnson, 2011, Garrett, 2012).

Although homelessness increases the risks of adverse outcomes, effects are not universal and differ between youths; meaning some youth are able to adapt to this adversity and have higher levels of life satisfaction and better overall outcomes than others (Buckner, 2008; Rew et al., 2019). "It is worthy to note that many children facing adverse circumstances portray themselves not as victims awaiting rescue but as individuals actively engaging in shaping their life courses. Far from being passive and dependent, they seek to

promote their survival, forge an identity, and negotiate a place for themselves in society" (Panter-Brick & Smith, 2000, p. 20).

In order to survive, these youth have learned how to navigate the existing systems and adapt to the street economy (Lankenau et al., 2005). Their lives necessarily revolve around maintaining family and friend relationships, earning money through work (e.g. panhandling, prostitution, day labor, unskilled labor), securing accommodation, enjoying a shower at a drop-in shelter, obtaining food from a food bank or mobile service provider, and engaging in social activities (Karabanow, 2006). In the context of adolescents experiencing homelessness, researchers have shown that risk factors are associated with adverse outcomes. Despite research demonstrating that protective factors mitigate the development of problem behaviors in other populations of adolescents, little is known about how protective factors work for adolescents experiencing homelessness (Heerde et.al, 2020; Tyler & Ray, 2019).

Protective factors like social connectedness can buffer against poor health outcomes, and promote well-being. Protective factors can operate on different levels (e.g. individual, interpersonal) and can change over time. Researchers have shown that social connectedness and knowledge of resources are contributing factors in resilience (Bender, 2007; Karabanow, 2006; Morgan et al., 2011; Stewart & Townley, 2019; Rew, Taylor-Seehafer, & Fitzgerald, 2001; Rew, Taylor-Seehafer, Thomas et al., 2001; Stewart & Townley, 2020; Taylor et al., 2004; Townley et al., 2016; Usborn, 2009). However, the relationship between social connectedness and resilience in adolescents experiencing homelessness is less understood.

PURPOSE

The purpose of this study is to understand how social connectedness functions as a protective factor for adolescents experiencing homelessness. The distinction between promotive and protective factors is subtle, but corresponds with the difference between a statistical direct (promotive) or indirect (protective) effect (Hayes, 2009; Masten, 2001). The indirect effect can be studied with a mediation model. The study is a secondary analysis of an existing dataset from a recent study of adolescents experiencing homelessness. Understanding that statistical mediation is necessary to test conceptual mechanisms as protective factors, this study examined the role of social connectedness as a potential mediator in the relationship between homelessness and resilience (Hayes, 2009).

Research about how protective factors like social connectedness and resilience interact and impact the perceived wellbeing of adolescents experiencing homelessness is limited. Several studies have investigated the impact of resilience on outcomes like psychopathology and well-being with mixed results, however the unique impact of social connectedness on resilience is missing. This study will attempt to quantify the contribution of social connectedness to resilience in a population of adolescents experiencing homelessness. Adding to the knowledge about social connectedness increases understanding of the process of resilience. This information can inform interventions for adolescents experiencing homelessness that leverage positive strengths-based coping strategies to improve outcomes.

THEORY

Resilience refers to the capabilities, processes or outcomes characterized by desirable adaptation in the context of risk or adversity. Resilience research is rooted in

systems theory as a unifying framework to integrate family and individual strains of resilience research (e.g. individual, family) as well as models of stress and coping.

Complexity

Complexity is the philosophical approach to the study, and embraces ontology in which reality is not just the additive product of simple interactions but is also nested and interdependent. This makes reality emergent with properties that are greater than the sum of the parts (Bhaskar, 1978; Byrne, 2014; Morin, 2007). These real properties can also function as mechanisms (transitive and intransitive) that contribute to the change inherent in the dynamic system (Bhaskar, 1978). The theoretical paradigm for this study is composed of nested meta-theories with relationism at the broadest level. This approach is consistent with the nested, interdependent and interrelated view of reality in philosophical complexity (Cillers, 1998; Woermann, 2016). Resilience models and definitions have broadly shifted to systems thinking (Masten, 2018) consistent with complexity theory that emerged from General Systems Theory (von Bertalanffy, 1973) and cybernetics (Ashby, 1956). The Relational Developmental Systems (RDS) framework guides this study of social connectedness and resilience in adolescents experiencing homelessness (Lerner et al., 2012; Overton, 2013). The RDS framework facilitates research that draws on and integrates ideas from multiple disciplines including ecological theory (Bronfenbrenner, 1979), developmental systems theory (Gottlieb, 2007; Lerner, 2006), developmental psychopathology (Cicchetti, 2010) and resilience theory (Masten, 2001, 2018; Rutter, 2012). The RDS framework is a conceptual framework consistent with a critical realist philosophy that focuses on the interconnections and interpenetrations between the structural components, rather than limiting analysis to the linear contribution of those structural components to a specific outcome (Bhaskar, 1979; Byrne, 2014; Collier, 1994).

Models are constructed to understand the relationships between the parts of the system (Cillers, 2001). Multiple methods can be used to gain information about those relationships (Byrne, 2014) and the models of system function and change over time can describe pathways of adaptation.

Adolescents experiencing homelessness are inherently complex. Viewed as complex systems these adolescents are:

- Nonlinear both in their individual dynamics and in the impact interventions, have on them;
- Causally complex (i.e., circular causality, feedback loops, concurrent events taking place at multiple levels) such that context and composition are interdependent;
- Agentic such that they are able to self-organize and make decisions with local information;
- Emerge out of the compositional, contextual factors of which they are comprised;
- Dynamic and evolving, usually along various social trajectories and over the life course;
- Historical (e.g. family, change over time) and phenomenological (e.g., adolescents have their own subjective, interpretive, frames for understanding and participating in their communities);
- They are spatially and sociologically open-ended with fuzzy boundaries;
- Comprised of conflicted, negotiated power struggles amongst major players and key subsystems.

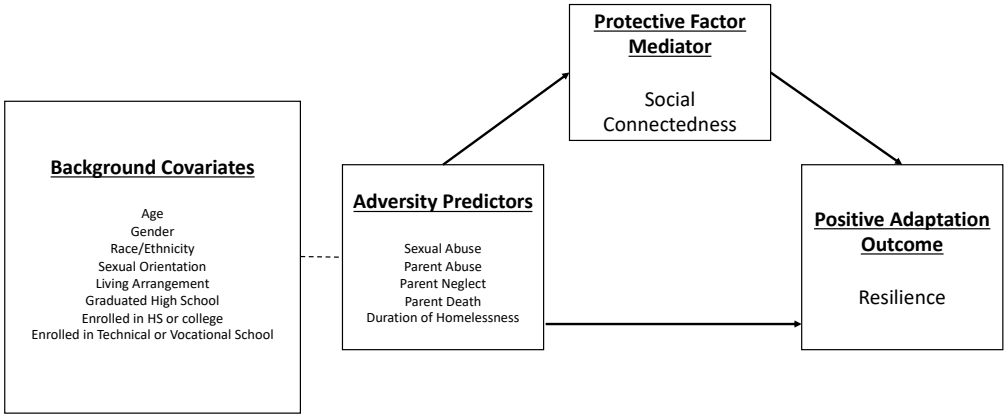
CONCEPTUAL FRAMEWORK

This research studied resilience as an outcome and was guided by an adapted version of a conceptual framework that delineated the components of resilience and the functional relationships (Masten, 2011) at the individual level. In this study, resilience was the adolescent's successful adaptation or coping to the demands of homelessness. The interaction between the adolescent and environment was the context, and included multiple systems (family, legal, healthcare). The functional components of the model included risk factors (e.g. adverse childhood events (ACE), sexual identity and education level), positive adaptation (e.g. resilience) and social connectedness as a mediator for the relationship between risk and resilience. This conceptual framework has been used extensively in studies of adolescents experiencing adversity homelessness by researchers at the University of Minnesota (Resnick, Masten, Sieving, Blum) and the University of Texas at Austin (Rew).

The adapted model (Figure 1) provides a conceptual framework for understanding how risk and positive adaptation are linked by protective factors. The unit of analysis is at the individual level, with an emphasis on the process that affects adaptation. In this case resilience is a process, and the model illustrates a potential pathway that is mediated by social connectedness.

Figure 1

The Adapted Model of Resilience in Adolescents Experiencing Homelessness



Background Risk factors

Adolescent development is always "development in context", and is shaped by all of the contexts and environments that support learning and healthy development (Fischer & Bidell, 2006; Goodnow & Lawrence, 2015; Spencer et al., 2015). Adolescents experiencing homelessness have accumulated risk factors that were shaped by their prior context and environment. Demographic risk factors include age, race/ethnicity and sexual orientation. Unstable living arrangements that may include sleeping over with friends (e.g. couch surfing), jail or detention, long term residential housing, foster care placement or living in a shelter are also considered risk factors for homelessness. They are important for inclusion in this study because they contribute to the net effect of context.

Adversities of Homelessness

Homelessness is the specific type of adversity that bounds this study of resilience. Cumulative exposure to psychosocial adversities like homelessness is a threat to development (Gest et al., 1999). Homelessness is shaped by the adolescent's experience, encompassing the processes of interaction and the adaptive pathways individual adolescents develop over the period of time they are homeless as well as their perception of the impact those adaptations have on their life experience after they have a physical address.

Protective Factors

Human development is inherently social, and occurs through reciprocal interactions between the individual and their contexts and culture, with relationships as the key drivers. Relationships characterized by sensitivity, attunement, consistency, trustworthiness, cognitive stimulation, and scaffolding enable children to develop secure attachments and mature in progressively complex ways (Bornstein, 2015; Center on the Developing Child, 2016; Fischer & Bidell, 2006; Li & Julian, 2012; Thompson, 2015).

Social Connectedness

Connectedness refers to a sense of being cared for, quality and satisfaction with relationships, and a sense of belonging (Sieving et al., 2017). Youth who feel connected are less likely to experience negative health outcomes related to sexual risk, substance use, violence, and mental health. In this study social connectedness referred to the adolescent's perceptions of connectedness within a dyadic relationship with a supportive adult. Research has shown that strong, positive relationships with parents and other adults protect adolescents from a range of poor health-related outcomes and promote positive

development (Sieving, et al. 2017). Social connectedness functions as a protective factor for adolescents experiencing homelessness (Kidd & Shahar, 2008; Lightfoot et al., 2011).

Psychological Capital

Psychological capital is a central tenant of positive psychology. Positive psychology refers to the individual mindset used to positively cope and adapt to stress. Psychological capital is a combination of four resources: hope, optimism, self-efficacy and resilience that interact and create the second order construct (Luthans et al., 2007; Luthans & Youssef, 2007). Psychological capital is associated with the distal outcome of subjective well-being and deals with the study of conditions and processes that enhance or contribute to flourishing or optimal function of individuals. This study will use hope, optimism and future time perspective to represent psychological capital.

Resilience

As a domain of inquiry, resilience refers to the processes of, capacity for, or pathways and patterns of positive adaptation in the face of adversity. Resilience is also defined as the capacity for a dynamic system to adapt successfully to disturbances that threaten the viability, the function or the development of that system (Masten, 2014). At any point in time, resilience depends on the resources and supports available to the adolescent through processes within the adolescent as well as between the adolescent and the systems he or she interact with.

Resiliency for adolescents experiencing homelessness looks different from that of adolescents experiencing other adversities. This type of resilience means having the capacity to navigate street life where successful adaptation includes daily survival and avoiding harm. A unique problem of adolescents experiencing homelessness is that

resilience must include the necessary skills and knowledge to remain safe and to ensure survival on the street and these skills are inherently risky (e.g., carrying a weapon or trading sex for items of necessity such as food or shelter) (Tyler et al., 2014). This skillset is somewhat incongruent with what is considered essential for successful and thriving adult development, such as employment, healthy relationships, and permanent housing (Tyler & Whitbeck, 2004).

PROBLEM STATEMENT

While it is increasingly recognized that resilience plays a role in overall health and well-being, less is understood about the relationship between social connectedness and resilience. Understanding how social connectedness functions in this relationship can add to the body of knowledge about how adolescents develop resilience in the face of adversity. This information can then be used to guide interventions for youth experiencing homelessness, and extended to include other specific populations of adolescents experiencing adversity.

RESEARCH QUESTIONS

1. Among adolescents 18-24 years of age who are experiencing homelessness, while controlling for demographics, what are the relationships among sample characteristics, adversity indicators, protective factors and resilience?
2. Among adolescents 18-24 years of age who are experiencing homelessness, what is the effect of social connectedness on the relationship of adversity to resilience?

3. Among adolescents 18-24 years of age who are experiencing homelessness, what is the effect of past adversity on resilience?

THEORETICAL AND OPERATIONAL DEFINITIONS

For this study, the following definitions were used to describe or define components and concepts.

Adolescence was defined as the period following the onset of puberty during which a person transitions from child to adult. The American Academy of Pediatrics defines adolescence as 11-21 years of age, dividing the group into early (ages 11-14 years), middle (ages 15-17 years) and late (ages 18-21 years). Young adulthood is the ill-defined period of time following adolescence. For this study adolescents experiencing homelessness are youth 18-24 years of age.

Background Risk Factors were defined as age, sexual orientation, history of abuse, death of a parent, history of neglect, living arrangement and graduation from high school.

Duration of homelessness was defined as the self-reported duration of time living away from family and was operationalized with the question "How long have you been living away from your family (months)"?

Homelessness was defined as living "in a shelter or on the street or living independently because they had run away, been pushed out, or drifted out of their family of origin" (Haldenby, 2007, p. 1232). All participants meet the definition of homelessness to participate in the study.

Psychological capital refers to the construct of hope, optimism and future time perspective. Hope will be measured with a tool developed by Snyder et al. (2003). Optimism will be measured with a tool developed by Scheier et al. (1985). Future time perspective will be measured with the tool developed by Heimberg (1961, 1963).

Resilience broadly referred to the study of capabilities, processes or outcomes characterized by desirable adaptation in the context of risk or adversity. Theoretically it was defined as the capacity for a dynamic system to withstand or recover from significant challenges that threaten its stability, viability, or development (Masten, 2011) and the capacity for a dynamic system to adapt successfully to disturbances that threaten the viability, the function or the development of that system (Masten, 2014). Resilience was operationalized with the tool developed by Wagnild and Young (1993) and refined for this population by Rew (2008).

Social Connectedness referred to a sense of being cared for, quality and satisfaction with relationships, and a sense of belonging (Sieving et al., 2017). Social connectedness was operationalized with the tool developed by Blum et al. (1989).

ASSUMPTIONS

1. Adolescents experiencing homelessness are complex adaptive systems.
2. The capacity for adolescents experiencing homelessness to adapt and develop are dynamic because complex adaptive systems are self-organizing.
3. Many interacting systems at multiple levels shape the function and development of adolescents experiencing homelessness.
4. Because of the interactions and interdependencies inherent in complex systems, change can spread across domains and levels of function.
5. Adolescents experiencing homelessness have the capacity for resilience.
6. Resilience is a complex construct that emerges from the interactions of context (e.g. risk and protective factors).

7. Adolescents experiencing homelessness have the cognitive and verbal capacity to answer questions about their lives.
8. Objective data from adolescents experiencing homelessness represent a type of knowledge of the complex reality that can be used to analyze relationships between concepts and constructs.

METHODS

Methods are the design, measures and data analysis used to answer the research questions.

Design

This is a secondary analysis of a longitudinal intervention study for youth experiencing homelessness and will include baseline data from the entire sample. The setting for the study included sites in Austin, Texas and Columbus, Ohio. The intervention included six one-on-one, face-to-face meetings designed to strengthen the adolescent's psychological capital and reinforce skills to resist risky behaviors (Rew et al., 2019).

Measures

Background refers to the demographic characteristics of the adolescent youth experiencing homelessness and the risk factors that may function to decrease or negatively affect outcomes. Common risk factors for adolescents experiencing homelessness include low education, single parent households, foster care, sexual orientation abuse, witnessed violence (Masten & Sesma, 1999; Rew, Taylor-Seehafer, Thomas et al., 2004). Duration of homelessness is the indicator of adversity and the primary independent variable operationalized with the question "How long have you been living away from your family?". The dependent outcome variable in this model is resilience, operationalized with

Wagnild and Young's 25-item resilience scale (1993). Social connectedness is the protective factor of interest in this study and is operationalized with a 9-item scale developed by Blum et al. (1989).

Data analysis

The design of the study was a quantitative descriptive analysis using linear regression and mediator analysis to understand the relationships among social connectedness, duration of homelessness and resilience. Mediation and moderation are methods to understand how mechanisms contribute to outcomes in social research. Statistically, they are used to understand cause and effect (Wu & Zumbo, 2008). A mediation analysis attempts to identify the intermediary process that leads from the independent variable to the dependent variable and is used to explain the process of 'how" and "why" (Baron & Kenny, 1986; Muller et al., 2005). A moderator postulates "when" or "for whom" an independent variable causes a dependent variable (Baron & Kenny, 1986; Frazier et al., 2004). In this study the theoretical hypothesis was that social connectedness changes the relationship between duration of homelessness (time away from family) and resilience, among the population of adolescents experiencing homelessness. The conceptual model is shown in Figure 2. However, both mediation and moderation results will be analyzed concurrently because they represent competing causal mechanisms through which social connectedness statistically influences the relationship between duration of homelessness and resilience.

SIGNIFICANCE TO NURSING

By definition, resilient adolescents cope better during or after a difficult situation than those who are not resilient (Lerner, 2012). They "bounce back" better when things

go wrong. They can look at the situation with different eyes to seek new ways to overcome challenges and achieve goals. This is an essential skill for adolescents transitioning into young adulthood who will experience many different types of adversity and may help them avoid behaviors like substance use and risky sex, and help them find healthier ways to reduce the negative effects of everyday stressors. Nurses working with adolescents are in a key position to help individuals by leveraging relationships and teaching problem solving and social skills that improve resilience. The knowledge gained from this study can extend nursing science by contributing to the knowledge about adolescent resilience.

LIMITATIONS

The major limitation of this study is the nature of the secondary analysis as this limits what concepts were chosen and how they were measured. Complex concepts like resilience are inherently non-linear in nature and are not always well represented with traditional statistical methods proposed for this study. Further research on this topic could benefit from an approach grounded more in relationality such as hierarchical multiple linear regression or network analysis.

Chapter 2: Review of the Literature

Adolescents experiencing homelessness are one of the most vulnerable groups in society because they are exposed to more risks and lack many of the protective influences of family and social institutions. Although the absolute number is difficult to quantify, approximately 1 in 10 youths 18-25 experience some type of homelessness in the United States (Morton et al., 2018; Morton, Dworsky, & Samuels, 2017). Adolescents experiencing homelessness are at risk for a range of physical (Medlow et al., 2014) and mental health (Hodgson et al., 2013) problems, violence (Davies & Allen, 2017), early pregnancy (Begun, 2015), substance use (Heerde & Hemphill, 2016), long-term homelessness and poverty (Caton et al., 2005), and early death (Auerswald et al., 2016; Roncarati et al., 2018). Among this diverse group of adolescents, evidence from research has shown that social connectedness is associated with resiliency and positive coping strategies (Rew, Taylor-Seehafer, Thomas et al., 2001). In order to define a pathway by which resilience can be achieved, a model that places risk factors in context with protective factors like social connectedness was analyzed. Chapter two was a scoping review of the major variables in a model to test a pathway toward resilience.

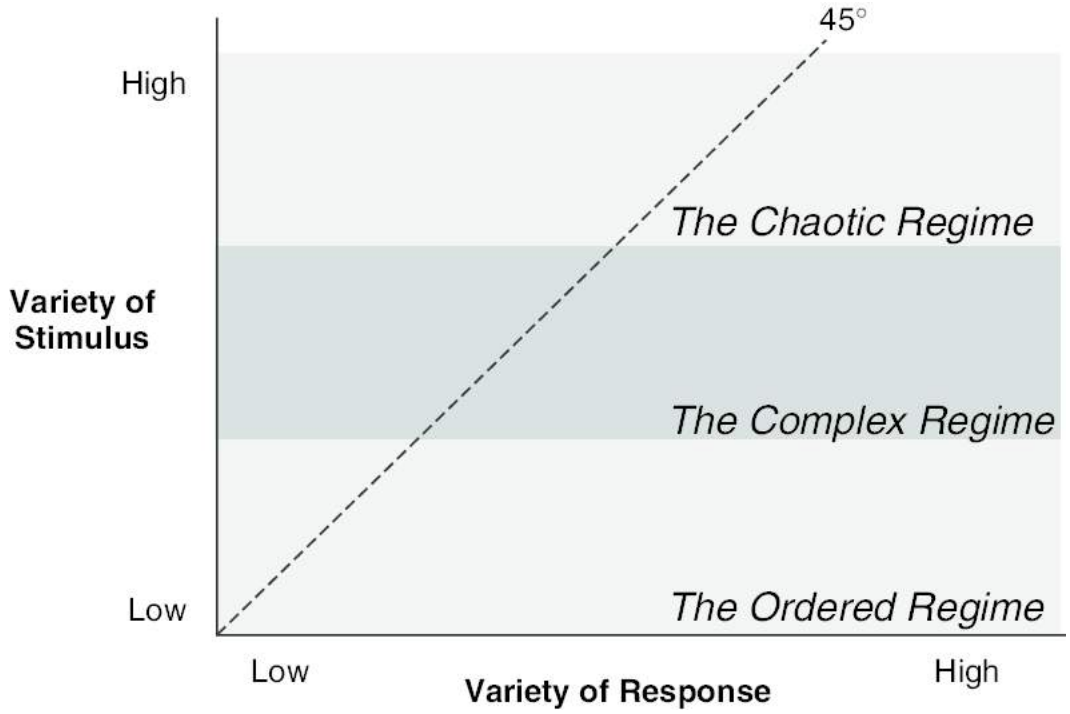
This analysis is rooted in work by Werner and Smith from a 30-year longitudinal study of a multiracial cohort of 698 infants born on the island of Kauai, Hawaii (Werner & Smith, 1992). The purpose of the study was to document the impact of biological and psychosocial risk factors on development through childhood, adolescence and early adulthood. In 1955 one of every three infants in Kauai was considered to be at risk for poor developmental outcomes because of their family's economic status, having a parent with a poor education, and living with family conflict such as mental illness or alcoholism. Study results showed that two-thirds of the children developed serious behavior and/or

learning problems by 10 years of age. However, one third became "competent, confident, and caring young adults (Werner & Smith, 1979). These children had positive outcomes in the face of adversity: they were resilient. This study also marked the understanding that resilience could not be reduced to characteristics of the adolescent or of the context alone and should be studied within the relational framework (Lerner et al., 2012).

The philosophical approach to this study is grounded in complexity. At a meta-theoretical / ontological level complexity and relationality guide thinking (Bhaskar, 1978, 1979). Max Boisot and Bill McKelvey are two researchers who apply ontological complexity to organizational studies and describe information processing in three regimes (Boisot and McKelvey, 2011). Fundamentally, knowledge is created by individuals within a local context as individuals use schema to process data to make information. In other words, they are filtering stimulus and discerning certainty from uncertainty. Information and knowledge are used to determine action. These schemata can be developed by the individual through observation, or can be developed by the individual over time through experience. In either case, schemata are the method individuals use to differentiate between perceiving data as chaotic or complicated. Chaos happens when individuals are unable to discern a pattern in data and are uncertain about how to act. The behavioral response to chaos is either "wait and see" or "headless chicken". In the ordered regime individuals have schema readily available to process the data and they are able to develop a routine response. They understand the data and can make predictions about what will happen. The complex regime exists between chaos and order where individuals must develop schema to act. When the schema they develop work, their response is adaptive and they are able to manage the uncertainty. When the schema does not work, they become anxious, have increasing uncertainty and are unable to develop effective coping strategies.

Figure 2

Ashby's Law in Three Regimes



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At the theoretical level, the Relational Developmental System (Lerner et al., 2012; Overton, 2010) provides a framework to apply positive psychology and a model of risk and protective factors to develop an understanding of resilience in adolescents experiencing homelessness. This theory provided a model of individual resilience inside the context of ecological relationships within the individual, between individuals at the interpersonal level, and between individuals and society. This way of thinking is consistent with a critical realist philosophy (Bhaskar, 1978, 1979).

RELATIONAL DEVELOPMENTAL SYSTEM FRAMEWORK

Using the Relational Developmental Systems (RDS) framework within the context of positive youth development I attempted to understand how social connectedness and resilience were statistically related in a group of adolescents experiencing homelessness. Relationality is a fundamental concept in any complex system and represents a postmodern approach to understanding the development of complex systems (Human & Cillers, 2013; Woermann, 2016). The relational worldview is in opposition to the traditional mechanistic worldview that considers adolescents to be atomistic beings who can be broken down into discreet, independent, pieces (Esfeld, 2015; Overton, 2013). Within the mechanistic worldview adolescent development is ruled by a single factor like genetic activity, which directly influences a specific structure, that in turn influences a specific function (Gottlieb, 2007). Alternately, development could be viewed as the additive sum of all of the different components related to development. In both cases, the mechanistic model moves unidirectionally based on a universalist notion that all data are quantifiable; and results in a distorted view of how adolescents develop.

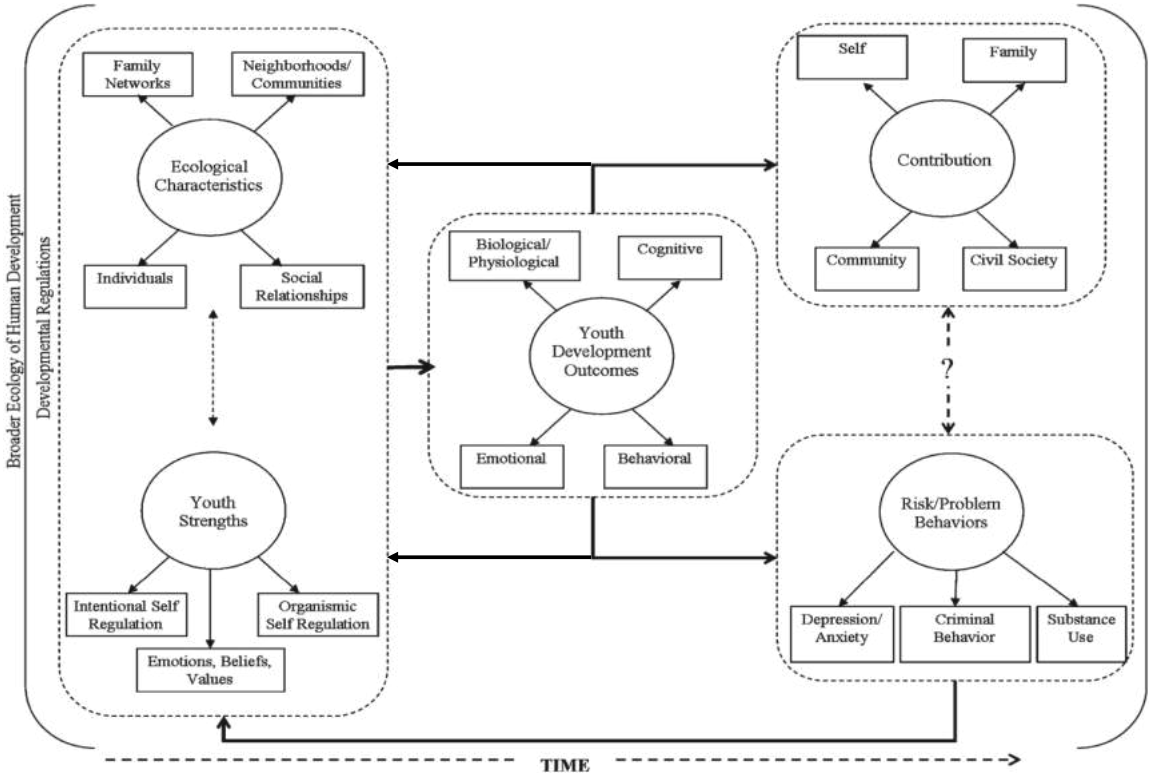
In contrast, the relational developmental worldview understands that biology and culture necessarily interact (Overton, 2013), and this interaction changes over time (Baltes, 1997). Viewed holistically, adolescents are the relational synthesis of biology and socio-cultural processes (Overton, 2013). They are complex assemblages of history and interpersonal relationships (Marcus & Saka, 2016). The RDS framework allows the researcher to consider multiple perspectives simultaneously (e.g. individual genetic activity; behavior; physical, social, cultural environment) in which development emerges from the bidirectional influences within and between levels of analysis (Gottlieb, 2007; Overton, 2013). Theoretically, the social developmental perspective in which adolescents are concerned with issues of identity and identity formation (Erickson, 1968) can be

combined with the ecological perspective in which adolescents are concerned with local activity settings and using those to help achieve identity resolution (Bronfenbrenner, 1979). Additionally, the RDS framework allows the researcher to consider the impact of history on the present (Baltes, 1997). Figure 2 illustrates a model of adolescent development using the RDS framework (Lerner et al., 2012). Phase one illustrates the interaction between the adolescent's strengths and his or her local ecology. Phase two illustrates potential proximal developmental outcomes that can branch to become distal outcomes like positive behaviors or risk/problem behaviors in phase three.

Positive youth development (PYD) emphasizes individual strengths (e.g. self-organization, plasticity) and the presence of environmental resources or "developmental assets" (Lerner et al., 2012). The core concepts in PYD include (A) developmental contexts (i.e. places, settings, ecologies, relationships with the potential to generate support, opportunity and resources; (B) the nature of the child/adolescent with the focus on the capacity to grow and thrive; (C) developmental strengths (attributes of the person, including skills, competencies, values, and dispositions important for successful engagement in the world) and two complimentary conceptualizations of developmental success; (D) the reduction of high-risk behavior; and (E) the promotion of thriving (Benson et al., 2006).

Figure 3

Lerner's Reinterpreted Relational Developmental Systems Model of the Individual-context Relations Involved in Resilience in Adolescence (Lerner et al., 2012, p. 302).



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Ecological Characteristics and Youth Strengths

As adolescents grow and change over time, mutually influential relations govern the exchange between the individual and the ecological context. These relationships are analogous to the "simple rules" in complexity that guide self-organization and emergent outcomes (Ashby, 1962; Cillers, 2002; Goldstein, 1999) and are called developmental

regulation in the RDS framework. Developmental regulation refers to the bidirectional relations that connect all of the levels and bound each of the phases in the model (Elder & Shanahan, 2006). Within the theoretical perspective of positive youth development (PYD) these relations are considered to be adaptive when the individual and ecological levels are in alignment. Key to this notion is that youth are embedded in ecological contexts that include the family networks, neighborhoods and communities, the individual and social relationships. Positive ecological contexts provide youth with physical and psychological safety, structure, supportive relationships, opportunities to belong, opportunities to learn social norms, opportunities to build skills, and support to develop self-efficacy and self-worth (Eccles & Gootman, 2002). Alternately, negative ecologies have been associated with antisocial behaviors (Persson et al., 2007). Each individual ecology possesses assets, and researchers have shown that social relationships are the ecological asset most likely to be associated with PYD (Theokas & Lerner, 2006), and those interpersonal relationships can be with peers and/or adults (within and outside of the family) (Lerner et al., 2012). Parent child relationships are a significant piece of the RDS framework. Parents provide a safe, nurturing environment for children to develop the fundamental adaptive systems which can be used over the life course to adapt to challenge. Parents are also the primary source of the cultural knowledge and practices that support resilience at many levels (Masten & Palmer, 2019). Additional ecological assets include institutions (e.g. schools), opportunities for interpersonal interaction and collaboration with adults (e.g. scouts, volunteering), as well as accessibility (e.g. geographic accessibility, transportation) (Theokas & Lerner, 2006).

Adaptive developmental regulations are the interaction of ecological characteristics as well as youth strengths. Adolescents have internal strengths that include intentional self-regulation, organismic self-regulation, and emotions, values and beliefs (Lerner et al.,

2012). Self-regulation is the relationship between behaviors and thoughts, attention and emotion that adolescents must develop to achieve positive adaption within their environment (Lerner et al., 2012). This a key developmental process that takes place within individuals and links thinking with action. Organismic regulation refers to the primarily passive neurological and biological processes that take place within the body. This type of internal regulation influences the adolescent's capacity to intentionally self-regulate and compensate. Intentional self-regulation refers to the agentic, purposeful selecting and enacting behaviors adolescents can use to attain significant goals (Brandtstädter, 2006). These optimization skills include resource recruitment, executive functioning and strategic tracking (Lerner et al., 2012). This higher level of thinking and functioning, when coupled with developing the means of attaining goals and adjusting goals if the capacity or capability to attain the goal is blocked, is fundamental for successful individual-context relationships.

Youth Development Proximal Outcomes

Youth developmental outcomes emerge from the interaction of youth strengths and ecological characteristics. These outcomes are biological/physiological, cognitive, emotional and behavioral outcomes that can feedback to become a youth strength and affect the bidirectional relationship between the ecological context and the youth strengths. Youth strengths can also be considered protective factors. Likewise, a lack of youth strength could be a risk factor. Positive youth development is operationalized as the *five C's* with the use of subscales of Competence, Confidence, Connection, Character and Caring (Lerner et al., 2005). Competence is a positive view of one's action in a specific domain (e.g. social, academic, cognitive, vocational). Confidence is an internal sense of overall self-worth and self-efficacy. Character involves respect for societal and cultural

rules. Connection includes positive bonds with people and institutions that are reflected in healthy, bidirectional exchanges between the individuals and peers, family, school, and community. Caring is the degree of sympathy and empathy felt towards others. The *five C's* are an index for adaptive self-regulation and should increase as adolescent's capacity for goal selection, skills for attaining them or for adjusting if the goals are blocked also increases (Gestsdottir & Lerner, 2007).

Contribution and Risk/Problem Behaviors as Distal Outcomes

Youth developmental outcomes generally lead to either adaptive contributions to self, family, community or society; or lead toward maladaptive risk and problem behaviors like psychopathology, substance use or criminal behavior. Distal outcomes feedback to the ecological factors and individual factors affecting developmental regulation. Therefore, both proximal and distal outcomes feedback to interact within the individual and influence their capacity to function within society, however the research about the impact of this interaction on resilience is limited.

RISK, PROTECTIVE AND RESILIENCE FACTORS

The desire to understand successful and unsuccessful pathways through adolescence led Garmezy to theorize a conditional relationship between stress and attributes, and to use that approach to study the impact of stress and personal attributes on outcomes in children at risk for psychopathology (Garmezy et al., 1984). In the past decades results of child development research have demonstrated how maladaptive pathways led to negative developmental outcomes like academic failure, school dropout, alcohol and other drug use, delinquency and problems with the law, violence, and psychopathology like anxiety, depression, and suicide (National Research Council (U.S.)

and Institute of Medicine (U.S.) Forum on Adolescence, 1999). At the individual level, personal attributes moderate the impact of stress in adaptation. Some personal attributes of adolescents experiencing adversity were protective and other attributes of the adolescent were indicators of risk and vulnerability. Resilience emerged from the contextual interaction of the risk and protective factors. This approach illustrates resilience as both an outcome and a dynamic process that follows adversity, and can only be studied if risk has been present (Fergus & Zimmerman, 2005; Mancini & Bonanno, 2009; Masten, 2011; Rutter, 2006).

Factors linked with better outcomes of adolescence and more successful transitions from childhood to adolescence and from adolescence to early adulthood can be protective factors and predictors of resilience. A "short list" of these factors include: one or more effective parents; connections to competent and caring adults; cognitive, attention and problem-solving skills, effective emotion and behavior regulation, positive self-perceptions (e.g. efficacy and self-worth); belief that life had meaning, hopefulness; religious faith and affiliations; aptitudes and characteristics valued by society; prosocial friends; socioeconomic advantages; effective school and school bonding; effective community (safe, emergency services, recreation centers) (Luthar, 2003; Masten, Best, & Garmezy, 1990; Masten & Coatsworth, 1998; Rutter, 2000)

In a recent review, resilience factors were protective factors statistically analyzed as mediators and/or moderators for the relationship between adversity and psychopathology. This analysis gives insight to the process of resilience. The research identified resilience factors at the individual, family and community levels that benefited mental health in adolescents following childhood adversity (Fritz et al., 2018). The 13 supported individual-level resilience factors included three cognitive (high: cognitive reappraisal, mental flexibility; low: rumination), four emotion regulation (high: distress

tolerance; low: alcohol coping expectancy, aggression, expressive suppression), three social interaction/attachment (low: insecure attachment, disconnection/rejection, other-directedness) and three personality/self-concept resilience factors (high: self-esteem; low: ego over-control, ego under-control). Family-level resilience factors consisted of four family support (high: family cohesion, positive family climate, immediate family support, extended family support) and two parenting resilience factors (high: positive parenting, parental involvement). At the community-level, social support was the only supported resilience factor. Fritz reviewed 22 studies of resilience with a range of childhood adversities that included some form of child maltreatment, family conflict, parent with mental illness, parent with alcohol or other drug use, poor parenting, and adverse life events. The study did not specifically consider homelessness as an adverse life event. In terms of resilience factors, Fritz concluded that the interrelatedness of resilience factors affected the relationship between childhood adversity and psychopathology. However, few of the models took more than a single resilience factor into account (Fritz et al., 2018).

PSYCHOLOGICAL CAPITAL

Positive psychology constructs like hope, optimism and future time perspective also have a protective function for adolescents. These concepts comprised the construct of psychological capital. Interventions that strengthen positive emotions, thoughts and behaviors are useful in promoting well-being and reducing stress in school aged youth (Waters, 2011). Hope, optimism and future time perspective are subjective psychological states that influence an individual's mindset and are predictors of behavior (Gillham, 2000).

According to Snyder, hope reflects individuals' perceptions about their capability to conceptualize goals, develop strategies to attain those goals and to maintain the

motivation to use those strategies (agency) (Snyder et al., 2003). Hope can exist as both a state and a trait. Hope can also exist at several levels of abstraction: 1) goals in general; 2) goals in a specific domain; 3) a single goal in particular. Larger goals give a sense of meaning and purpose in life (Gillham & Reivich, 2004).

Optimism is a tendency or a disposition to expect the best and tends to be more general than hope (Gillham & Reivich, 2004). Optimism functions by lowering an individuals' vulnerability to emotional distress and improves overall functioning (Fitzpatrick, 2017). Optimistic individuals tend to have greater success in life and report less depression and anxiety. In a recent study of adults experiencing homelessness optimism functioned as a mediator in the relationship between adversity and depression and anxiety (Fitzpatrick, 2017).

Time perspective refers to thoughts and attitudes about the past, present and future. Wood (1997) showed that adolescents who ran away from home tended to be more present focused than those who had not run away. Time perspective is intertwined with hope, optimism and resilience. Werner showed that low-income adolescents who were more hopeful developed into healthier adults when compared to their counterparts (1994). Worrell and Hale (2001) showed that hope for the future distinguished between adolescents who graduated from high school and those who dropped out. Future time perspective has also been associated with resilience among adolescents facing political violence (Seginer, 2008). Research with adolescents has shown that time perspective is meaningfully associated with hope, perceived life chances, self-esteem and perceived stress (Worrell & Mello, 2009).

Resilience is defined as the capacity of a dynamic system to adapt successfully to disturbances that threaten the viability, the function, or the development of that system (Masten, 2014). Initially, resilience was inferred on the basis of a pattern of characteristics

because adolescents were "doing well" and had experienced adversity (Masten et al., 1999). Models were analyzed that included single risk factors and cumulative risk factors, culminating in models that included cumulative risk and adaptive factors over time. In time, the approach to understanding resilience built on the risk and protective factors model layered with developmental psychology and positive psychology was used to identify the strongest qualities individuals possess that represented resilience (Seligman & Csikszentmihalyi, 2000). This final approach grounded in the RDS framework functioned to encompass the previous theoretical perspectives and is consistent with the metatheoretical approach of complexity.

Resilience also defines a system that can function under conditions of uncertainty (Kahneman & Tversky, 2000; Tversky & Kahneman, 1973). Adolescents are authors of their own story; yet their lives are embedded in family and school, as well as community and society. Their capacity to adapt depends on the adolescent's perception of multiple interacting systems as an active agent. The adolescent's actual world is an assemblage of systems that include neurobiology (e.g. immune, HPA, CNS), interpersonal relationships (e.g. family, peers, trusted adults), healthcare, school, among others (Bhaskar, 1979; Lerner et al., 2012; Marcus & Saka, 2016). This makes the reality of resilience more like that of a continuum that differs across different domains rather than an empirical fact or an actual perception (Bhaskar, 1978, 1979; Pietrzak & Southwick, 2011).

Lerner defines resilience as the outcome of adaptive developmental relations between the person-environment context (Lerner et al., 2012). When adolescents have the capacity to utilize skills that can help them manage the uncertainty in an environment marked by risk and adversity, resilience is more likely. Within the RDS framework, salient characteristics of the person-environment interaction can be identified that differ between adolescents characterized as resilient and the rest of the population of adolescents. Among

those characteristics is how the individual processes information and makes decisions about how to act (Stacey, 2003).

PSYCHOLOGICAL CAPITAL AND ADOLESCENTS EXPERIENCING HOMELESSNESS

The study of psychological capital in adolescents experiencing homelessness is relatively limited. Rew et al.'s (2016) work showed that a brief, street-based intervention could improve psychological capital in a population of female youths experiencing homelessness, could reduce health risk behaviors and could improve behavioral goals. The finding of significant increases in resilience and social connectedness across both groups also reflects the importance of social interaction in building psychological capital.

In order to understand how resilience emerges within a population of adolescents experiencing homelessness, risk and protective factors for homelessness must be identified. Adolescence and young adulthood represent a key developmental period in which individuals construct their self-identities and grow to become competent, caring, compassionate, contributing members of society. Adolescents without stable housing experience increased stress and risk factors that can limit their healthy development and progression to adulthood. Some risk factors may increase the likelihood that children and adolescents will run away or become homeless. Previous research has shown that risk factors are important to understanding the pathways into homelessness (Herman et al., 1997; Shelton et al., 2009). According to Thompson and Pillai (2006) youth who run away come from families who are struggling with complex social problems such as poverty, unemployment, homelessness, child abuse, partner violence, substance abuse, and mental disorders. Many of these youth do not have secure attachment relationships or connections to effective schools and community supports (Easterbrooks & Graham, 1999; Kidd & Shahar, 2008). These risk factors can lead adolescents to engage in risky behaviors like

alcohol and other drug use, risky sex behaviors, conduct problems and delinquent behavior (Milburn et al., 2006; Rew, 1996). In many cases, these behaviors are functional, purposive, instrumental and goal-directed; and can be influential for peer acceptance and respect, establishing autonomy and coping with anxiety and depression (Lerner & Ohannessian, 1999).

In a recent systematic review of causes of child and youth homelessness in developed and developing countries, the most common risk factor for street involvement was poverty in developing countries and family conflict in developed countries; followed by abuse, psychosocial health problems and delinquency (Embleton et al., 2016). Another study identified male gender, non-heterosexual identity, low educational attainment, unemployment, adverse life events in childhood, criminal behavior or incarceration, a runaway history, a history of higher number of moves, psychiatric problems, and a history of suicide attempt (Nilsson et al., 2019). Four types of maltreatment are commonly recognized: sexual abuse, physical abuse, emotional abuse and neglect. Maltreatment and interpersonal violence have a large public health impact because of the long-term impact of the violence on the child's neurological, cognitive, emotional development and overall health (Butchart et al., 2006). Research reports indicate that a significant percentage of children and adolescents who run away have been exposed to different forms of abuse at home (Benoit-Bryan, 2011; Hammer et al., 2002). Verbal, physical, and sexual abuse may increase the chance that children and teens will run away from home.

In terms of verbal abuse, Benoit- Bryan (2011) showed that youth who had reported verbal abuse in the family were more than twice as likely to have run away from home (11.7 %) than those who did not report verbal abuse (5.3 %). With regard to physical abuse, children and adolescents who reported family-related physical abuse in Benoit-Bryan's (2011) longitudinal investigation were almost three times likely to run away from home

(17.4 %) than those youth who did not report physical abuse (6.3 %). Children and adolescents who reported being sexually abused in Benoit-Bryan's (2011) investigation were more than twice as likely to run away (17%) than those who did not report being sexually abused (7.9 %). Each type of maltreatment was associated with multiple adolescent health risks and had implications for health across the life course.

Adverse childhood experiences are a broad category that can include things like abuse, neglect, caregiver mental illness, and household violence that are frequently not in the adolescent's control. Adverse experiences in early childhood can threaten brain development, learning, and lifelong health (Shonkoff et al., 2012). It is likely that more than one risk factor contributes to homelessness, and that the factors interact synergistically (Embleton et al., 2016; Masten, 2014) because homelessness is associated with many risk factors for health and behavior problems in children (Embleton et al., 2016; Samuels et al., 2010; Tobin & Murphy, 2013).

At the opposite end of the spectrum, protective factors may buffer against poor outcomes (Dang et al., 2014; Kidd & Shahar, 2008; Lightfoot et al., 2011). Masten identified several intra-individual level protective factors. Many vary by age but include problem-solving skills, self-regulation skills, hope or faith, mastery motivation and a sense that life has meaning (Masten, 2018). At the interpersonal level, relational attributes like secure attachment relationships, and connections to effective schools and community supports are also protective. Dang et al. (2014) studied the role of social connections and found that natural mentors served adolescent's developmental need for an adult role model who could help them learn skills necessary to transition into adulthood. Adolescents experiencing homelessness who had natural mentors also had an increased sense of belonging and were less likely to be involved in risky sexual behaviors. Another study assessed global life skills like goal setting, decision making and self-reliant coping, and

found that adolescents experiencing homelessness with these skills are less likely to engage in multiple problem behaviors (Lightfoot et al., 2011). Finally, Kidd and Shahar (2008) found that self-esteem protected adolescents experiencing homelessness against feeling lonely or trapped, thoughts of suicide and alcohol and other drug use.

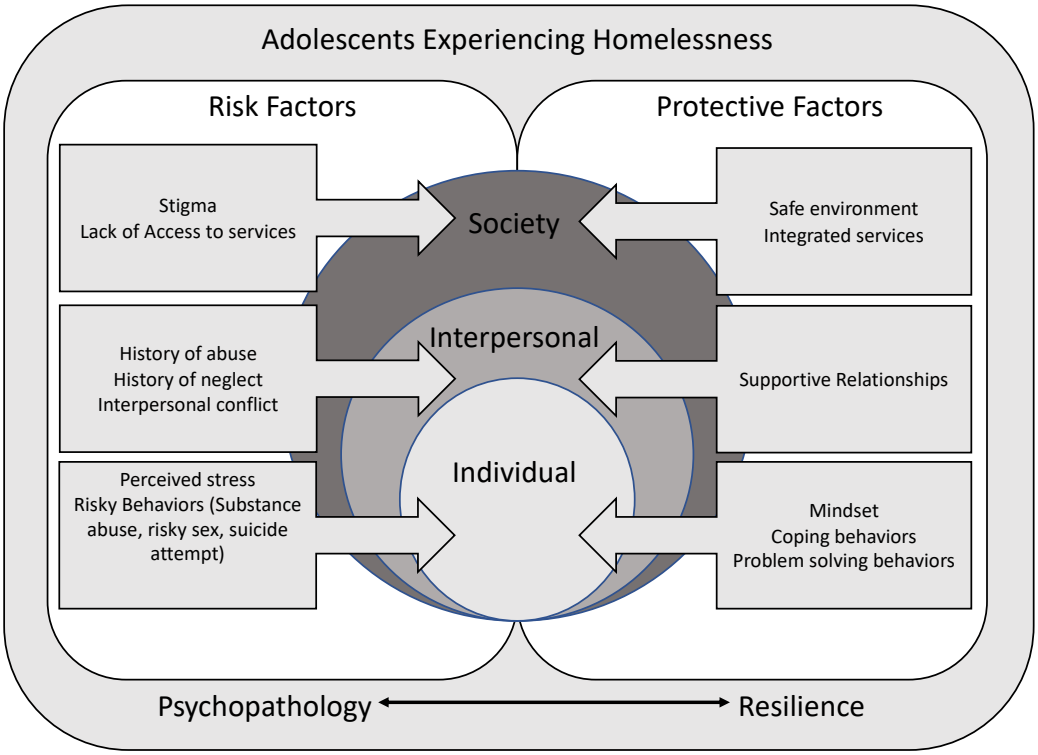
Some risk and protective factors are fixed and do not change over time (e.g. gender, adverse childhood experiences); others are variable and do change over time (e.g. behaviors, employment). Both risk and protective factors can be found at the individual, interpersonal and society level. Examples of individual level risk factors include psychopathology, personal identity, developmental maturity, gender, previous history of maltreatment or adverse childhood events and genetics (e.g. the predisposition to substance abuse or prenatal exposure to alcohol or other drugs). Interpersonal risk factors include family conflict and interpersonal conflict. Societal risk factors can include stigma or access to welfare services. Thus, an understanding of both risk and protective factors is necessary to appreciate the complex pathway towards resilience.

Figure 4 models the risk and protective factors discussed at different levels for adolescents experiencing homelessness at a *specific* point in time. Risk and protective factors interact at each level. Because the individual is nested within the interpersonal and the society level, the factors at each level also interact. In Figure 4 society is the highest level. This level represents the cultural norms and expectations for adolescent's role in society. This level manifests as many different facets of environment (e.g., weather, attitude to homelessness, expectation for individual responsibility). Level two is the adolescent's social network of dyadic relationships. These relationships can be dichotomized as risky or protective depending on the nature of the individual dyad and shape the individual adolescent's knowledge. Knowledge was created through social interaction within the environment, and is now internalized as a positive mindset or

negative stress. In the adapted model of Figure 1, the covariates are the fixed factors that do not change. The model shows social connectedness (level two) mediating the relationship between level two adversity predictors (sexual abuse, parent abuse, parent neglect, parent death and duration of homelessness (time away from family) and level one resilience.

Figure 4

A Model of Risk and Protective Factors for Adolescents Experiencing Homelessness



Approaching resilience from the relational developmental systems framework we are called to focus on the social interactions between the parts of the system, with the

understanding that these social interactions change over time. In this study attention is drawn to the social connectedness of youth experiencing homelessness as a necessary condition for survival. Research has linked positive psychological characteristics like hope and optimism to distal outcomes like life satisfaction and wellbeing in youth experiencing homelessness (Rew et al., 2019).

Resilience is an emergent proximal outcome that manifests when adolescents develop adaptive coping strategies to manage the uncertainty. In order to better understand the process of resilience I reviewed risk and protective factors that affect the outcome of resilience in adolescence, and identified resilience factors associated with better outcomes as well as resilience factors studied as mediators and/or moderators of psychopathology.

Chapter 3: Methods

Chapter two was a review of the literature necessary to answer the research questions. Chapter three presented the proposed method of analysis to answer the research questions. The philosophical perspective of this study was grounded in complexity. In an effort to understand if resilience is in fact complex, or merely complicated I situated the process of resilience in the ordered realm where outcomes are predictable. The traditional approach to understanding causal mechanisms within this realm uses linear structural equation modeling (e.g. Baron & Kenny, 1986; MacKinnon, 2008). Therefore, mediation was the statistical method chosen to analyze relationships and answer the proposed question (Hayes, 2009).

DESIGN

The study completed was a secondary analysis of data from An Intervention to Promote Responsible Health Behaviors in Homeless Youths [R01 HD083576] funded by the National Institute of Child Health and Human Development/National Institutes of Health. Understanding the causal mechanisms that can lead to resilience is the goal of this researcher; path analysis was the method chosen to clarify the correlations between variables and to indicate the strength of a causal hypothesis. A mediation analysis was completed to understand whether social connectedness functioned as a mechanism for resilience in adolescents experiencing homelessness. Mediation was also used to understand the relationships between hope, optimism, future time perspective and resilience in this same population. An understanding of the causal mechanisms for resilience can assist researchers, policymakers and practitioners to develop interventions that are more likely to be effective for adolescents experiencing homelessness.

Parent Study Design and Setting

The design of the parent study was a randomized controlled trial using a Solomon four-group design, of an individualized one-on-one intervention for adolescents experiencing homelessness. The study received a full board review by the University of Texas at Austin IRB and approval for the parent grant (2015-07-0009). The study implemented the Possible Selves Intervention (PSI), an education intervention designed to strengthen an individual's psychological capital and to reinforce skills to resist alcohol and other drug misuse and risky sexual behaviors (Rew et al., 2016). For the parent study, youths 18-24 years of age who were experiencing homelessness and sought assistance from the local drop-in center in either Columbus, OH or Austin, TX were randomly assigned to one of the four groups using the Solomon four-group design. Participants assigned to all four groups answered demographic questions at time of enrollment. Group 1 received the pretest, the intervention and the post-tests (n= 156). Group 2 received the pretest and the post-tests without the intervention, but they received the control condition of services as usual from the drop-in center (n=156). Group 3 received the intervention and the post-tests (n=156). Finally, Group 4 received the post-tests only, but they also received the control condition of services as usual from the drop-in center (n=156). The Solomon four-group design was chosen because the combination of conditions and controls allows the researcher to ensure confounding variables and extraneous factors, including the pre-test, are not influencing the results (Shuttleworth, 2009).

Data were collected between June 22, 2016 and January 24, 2020 at two sites: Columbus, OH and Austin, TX. These two cities were chosen to represent 'typical' American cities. Columbus is ranked 16th nationally with a population of 892,533 in 2018. Austin is ranked 11th nationally with a population of 964,254 in 2018. In terms of cost of living, it is approximately 28% cheaper to live in Columbus than to live in Austin.

Although the number of unaccompanied unsheltered homeless 18-24 years of age is difficult to know for certain, the point-in-time estimates for 2020 report 137 for Columbus and approximately 108 for Austin (HUD, 2020). The point-in-time estimate is a count of all of the sheltered and unsheltered people experiencing homelessness on a single night in January and is one indicator for the need for services. The Director of the drop-in center in Columbus reported providing services to 1000 unduplicated youth of this age per year and the drop-in centers in Austin have reported similar service numbers (Lynn Rew, personal communication). The Columbus site recruited 340 participants, and the Austin site recruited 262 participants for a total of 602 participants in the study (prior to data cleaning).

Data for the parent study were collected by trained graduate research assistants (GRAs) in a private room at the respective drop-in center. Upon enrollment in the study each participant was given a unique number, signed a consent to participate and reviewed the IRB approval for the study. Data were gathered by GRAs trained to read all of the questions and response choices to participants and record them on a laptop computer. All participants completed the demographic questions. Participants in two conditions also completed an additional set of questions that included resilience and social connectedness scales as components of the pre-test. Table 1 shows the two conditions of interest and the number of participants in the parent study.

Dissertation Study Design

The main objective for this dissertation study was to understand if social connectedness mediated the relationship between duration of homelessness (i.e., time away from family) and resilience, while controlling for background factors (e.g. age, sexual orientation, history of abuse or neglect, death of a parent, education level, living

arrangement). The dissertation study used demographic data gathered at baseline and data gathered from the Pre-test administered to Group 1 and Group 2 to answer the research questions because instruments for psychological capital and social support were administered to the participants who completed the Pre-test. The dissertation study was a secondary analysis of deidentified data from the parent study which was collected through UT IRB approved methods. After consulting with UT IRB about this study they determined it did not qualify as Human Subjects Research and was exempt (Appendix A).

DISSERTATION SAMPLE

The data for this secondary analysis included background demographics, adversity variables, psychological capital variables and social connectedness for 312 participants prior to data cleaning. Descriptive statistics for the variables used in the analysis are provided in Table 4. The final sample included 269 participants. The sample was 42% female and 58% male. Participants were 18-24 years of age, and 23 year-olds were the largest group representing 20% of the sample. Overall, 70% of the total sample identified as straight (50% male, 21% female), and 30% of the sample identified as an alternative orientation (e.g., homosexual, lesbian, bisexual, questioning, transgender, uncertain) (9% male, 21% female). Sixty-five percent of the sample identified as Latino/Hispanic (36% male, 29% female). In the past year, 28% of the sample reported living with adult friends in their house or apartment.

MEASURES

The parent study used a battery of valid research instruments to measure demographics and theoretical variables. Table 2 lists the data elements, and scales (type, number of items) with notes. All questions and scales were written at the 6.4 grade level

(Flesch-Kincaid Readability Tests, ND) and had been used previously with adolescents experiencing homelessness (Rew et al., 2019).

Background

The background for this analysis included the demographic data (age, gender, race/ethnicity, sexual orientation, education, living arrangement). Demographic data were gathered with an investigator designed tool. See data cleaning section for descriptions of variables type and factor levels.

Adversities of Homelessness

Adversity predictors were duration of homelessness (time away from family), sexual abuse, parental abuse, parental neglect, and death of a parent. These data were gathered with an investigator designed tool. See data cleaning section for descriptions of variables type and factor levels.

Psychological Capital

Psychological capital variables included hope, optimism, and future time perspective.

Hope was measured with the Children's Hope Scale (CHS), a six-item self-report measure of children's perceptions that their goals can be met developed by Snyder et al. (1997). The CHS used an 8-point Likert response with anchors of *"definitely false (1)"* and *"definitely true (8)"*. A sample item from the scale is "*If I should find myself in a jam, I could think of many ways to get out of it.*" (Snyder et al., 1997). Total scores ranged from 6-48 in this sample with higher scores representing greater hope. Internal consistency estimates (alpha) for the original study ranged from 0.72 to 0.86. Test-retest reliability estimates (over a one-month interval) ranged from 0.71 to 0.73 (Snyder et al., 1997).

Optimism is a tendency or a disposition to expect the best and tends to be more general than hope (Gillham & Reivich, 2004). Optimism was measured with the original Life Orientation Test (LOT) (Scheier et al., 1985). The LOT was a 12-item test with a Cronbach's alpha of .86. The LOT scale used a 5-point Likert response with anchors of *"strongly disagree (0)"* and *"strongly agree (4)"*. A sample from the LOT scale is *"In uncertain times, I usually expect the best."*.

Future time perspective was measured with a 4-item test developed by Heimberg (1961, 1963). The test has a Cronbach's alpha of .88 in the original study and used a 7-point Likert response with anchors of *"1 (strongly disagree)"* and *"7 (strongly agree)"*. A sample from the scale is *"I expect to become the kind of person I most want to be."*.

Social connectedness

Social connectedness has been studied as a protective factor against acting out and quietly disturbed behaviors for adolescent boys and girls (Blum et al., 1989; Resnick, Harris, & Blum, 1993). The reliability coefficient has been reported as 0.72 in the seminal study with adolescents (Blum et al., 1989). Social connectedness is a multidimensional construct that assesses connectedness with adults, social service people, parents, family, and friends. The Social Connectedness scale uses 5-point Likert responses with anchors of "*Not at all (1) and Very much (5)"*. A sample item from the Social Connectedness scale is "*How much do you feel that adults care about you?"*. Rew adapted the wording of the items on the scale to be appropriate for youth experiencing homelessness and reported a Cronbach's alpha of 0.87 (Rew et al., 2008).

Resilience

The resilience scale has been used with adolescents experiencing homelessness in previous studies (Masten et al., 1999). The reliability coefficients in other studies with adolescents ranged from 0.93 to 0.95 (Rew et al., 2016; Thompson et al., 2008). The Cronbach's alpha for the scale was 0.78 in the original study of older adults by Wagnild and Young (1993). The Resilience Scale uses 7-point Likert responses with anchors of "*strongly disagree (1) and strongly agree (7)".* Total scores range from 25-175 with higher scores representing greater resilience. A sample item from the Resilience Scale is *"I usually take things in stride"* (Wagnild & Young, 1993) p. 169.

Table 1

Covariates and Adversity Predictors for Analysis in a Study of Youth Experiencing Homelessness

Variable Name	Attribute	Notes
Background Characteristics		
Gender	Categorical	Factor with 2 levels: Male, Female
Age		
Sexual orientation	Categorical	Factor with 2 levels: straight, alternative orientation
Race/Ethnicity	Categorical	Factor with 7 levels: Latino/Hispanic, White, Black, Latino/a, American Indian, Asian, Other
Graduated high school	Dichotomous 1-no/2-yes	Graduated from high school
Living arrangement	Categorical	Factor with 7 levels: In a shelter; In jail, youth detention, or long-term residential housing; On the street/outdoors; With adult friends in their house or apartment; With foster parents in their house or apartment; With parents or relatives in their house or apartment; Other
Graduated High School	Dichotomous 1-no/2-yes	Graduated from high school
Enrolled Vocational or Technical school	Dichotomous 1-no/2-yes	Enrolled in vocational or technical training program
Enrolled in high school or college	Dichotomous 1-no/2-yes	Enrolled in high school or college
Adversities of Homelessness		
Sexual abuse	Dichotomous 1-no/2-yes	Have you ever been sexually abused?
Parental abuse	Dichotomous 1-no/2-yes	Parent(s)/guardians abusing me
Parental neglect	Dichotomous 1-no/2-yes	Parents/guardians neglecting me
Parental death	Dichotomous 1-no/2-yes	Parent(s)/guardian(s) died
Duration of Homelessness (time away from family)	Ratio Calculated with date	When did you first run away from home?

POWER ANALYSIS

A power analysis was completed for the study using R. For a medium effect size of 0.15 using Cohen's 1992 criteria, with alpha = 0.05 and 26 predictors, a sample size of 269 observations, the power = 0.99998 (Fixed model, R^2 deviation from zero). Therefore, the estimated sample available is sufficient to complete the analysis.

DATA CLEANING

This study analyzed a subset of data from a cross-sectional study of participants who took part in An Intervention to Promote Responsible health Behaviors in Homeless Youths [RO1 HD083576] funded by the National Institute of Child Health and Human Development/National Institutes of Health. Demographic and pre-test data were analyzed for the subset of 312 participants randomized to Group 1 and Group 2 of the Solomon four-group design. These data were initially downloaded from REDCap in both a long and wide format. In Excel the data was subset into three smaller datasets: one containing the demographic data for all participants, and a second containing the pre-test data from the Texas location and a third containing the pre-test data from the Ohio location. The pre-test data from both locations were combined and spot checked to ensure all of the columns aligned. Finally, the datasets were imported into R.

Data from the demographic subset were filtered by group number to retain those participants who were randomized into the pre-test group and the variables of interest were selected. In the same manner, variables of interest were selected from the pre-test data. These two smaller datasets were next merged using the "Unique ID" variable to create a compressed dataset that included 312 observations of 170 variables. R code for data cleaning and analysis is provided in Appendix B. Data from parent study selected for analysis represents data prior to cleaning. Data cleaning included removing duplicates (4),

filtering those participants who identified as "other" for gender (16) and filtering those participants with a reported resilience of zero (23). The final dataset used in the analysis included 269 observations. All further cleaning and analysis for this study was completed using R Studio Version 1.4.1106.

The demographic variables used for analysis were gender, age, sexual orientation, race/ethnicity, living arrangement, and education. In the demographic subset *Duration* was hand-coded from the question *"How long have you lived away from your family"*. Data were converted from a string-number format (e.g. "about 6 months") into the number of months. The categorical variable gender was generated from the responses to "Are you:". Subjects who responded as "other" were filtered out because that predictor category was too small to drive the outcome. Age was converted from a string to a number format and non-numerical responses were re-coded as numbers. To generate the variable for sexual orientation, the responses to *`straight/heterosexual`, `bisexual`, `questioning`, `lesbian`, `gay`, `transgender`, `homosexual`, `uncertain`* were first numerically coded. After analyzing the responses two factors were created: "*straight*" and "*alternative orientation*". Race/Ethnicity was generated by numerically coding the responses to *"Are you Latino/Hispanic?"* through *"other"*, creating a composite and factoring the responses into seven levels. Living arrangement was generated by numerically coding the responses to *"In the last year, what was your primary living arrangement? (check one)",* creating the composite and factoring the responses. Finally, education was generated by assigning numeric responses to *"Graduated from high school", "Enrolled in vocational or technical training program", "Enrolled in high school or college"*.

Adversity variables created for analysis were sexual abuse, parent abuse, parent neglect, death of a parent and duration of homelessness. Following the same strategy, responses to the questions *`Have you ever been sexually abused? (Sexual abuse is when*

someone in your family or someone else touches you in a place your did not want to be touched or does something to you sexually that they shouldn't have done.)`, `Parent(s)/guardians abusing me`, `Parents/guardians neglecting me`, `Parent(s)/guardian(s) died` were coded numerically.

Variables for psychological capital (hope, optimism, future time perspective) social connectedness and resilience were created by expanding the categorical variables, numerically assigning responses from each Likert option, summing the measures and reverse coding where indicated as instructed by their respective primary codebooks (hope, optimism, future time perspective, social connectedness and resilience,). Table 3 includes the Cronbach alphas for each composite measure. These reliability measures were calculated from the smaller subset of data used for the analysis.

Hope was measured with the Children's Hope Scale (CHS), a six-item self-report measure of children's perceptions that their goals can be met developed by Snyder et al. (1997). Six items were retained with an 8-point Likert response format. The hope composite was created by numerically coding and then summing the six questions in the measure. Scores in this sample ranged from 6 to 48 with higher scores indicating higher amounts of hope. The Cronbach's alpha for the dataset used in the analysis was 0.77, a value considered acceptable by Nunnally (1978).

Optimism was measured with the original Life Orientation Test (LOT) (Scheier et al., 1985). All twelve items were retained for the analysis. The composite was created by numerically coding all questions and reverse coding four questions. Next all of the responses were summed. Scores for the analysis sample ranged from 0 to 46 with higher scores indicating higher amounts of optimism. The Cronbach's alpha for the analysis sample was 0.72, a value considered acceptable by Nunnally (1978).

Future time perspective was measured with a 4-item test developed by Heimberg (1961, 1963). All four items were retained with a 7-point Likert response format. The composite was created by numerically coding and then summing the four questions in the measure. Scores ranged from 0 to 28 with higher scores indicated higher amounts of future orientation. The Cronbach's alpha for the analysis sample was calculated to be 0.73. Again, a value considered to be acceptable by Nunnally (1978).

Resilience was measured using the resilience scale developed by Wagnild and Young (1993). The resilience composite was created by numerically coding and then summing the 25 questions in the resilience measure. Scores on the measure ranged from 0 to 173 with higher scores indicating greater resilience. The Cronbach's alpha for this sample was calculated to be 0.86. This value is greater than the value of 0.78 reported in the original study by Wagnild and Young when used with older adults (1993).

Social connectedness was measured using a revision of the scale used by Blum, Harris, Resnick and Rosenwinkel (1989) and Rew, Grady, Whittaker, and Bowman (2008). Seven items were retained with a 5-point Likert response format. The social connectedness scale score was created by numerically coding and then summing the seven questions in the social connectedness measure. Scores ranged from 0 to 35 with higher scores indicating higher social connectedness. The Cronbach's alpha was calculated to be 0.79. This value is considered acceptable by Nunally (1978) but lower than the 0.87 level reported by Rew et al (2008).

Table 2

Reliability of Composite Variables in a Study of Youth Experiencing Homelessness

Variable	Number of items	Number of responses	Cronbach's alpha	Author
Social Connectedness	7	5	.79	Blum et al. (1989); Rew et al. (2008)
Resilience	25	7	.86	Wagnild & Young (1993)
Hope	6	8	.77	Snyder & Rand (2003); Snyder et al. (2003)
Optimism	12	5	.72	Scheier (1985)
Future time perspective	4	7	.73	Heimberg(1961, 1963)

Note: Reliability calculated from the subset of data analyzed for the study.

DATA ANALYSIS

The proposed model seeks to understand the role of social connectedness on the relationship of duration of homelessness to resilience. Specifically, is social connectedness a mechanism necessary for resilience to manifest in adolescents experiencing homelessness? Because the question is asking about the indirect effect of social connectedness, mediated is the statistical method of choice.

In Hayes (2009) description of this method,

> *a* is the coefficient for *X* in a model predicting *M* from *X*, and *b* and *c'* are the coefficients in a model predicting *Y* from both *M* and *X*, respectively. In the language of path analysis, c′ quantifies the direct effect of *X*, whereas the product of *a* and *b* quantifies the indirect effect of *X* on *Y* through *M*. If all three variables are observed, then $c=c' + ab$. Simple algebra shows that the indirect effect, *ab*, is just the difference between the total and direct effect of *X*: $ab = c - c'$. The indirect effect is interpreted as the amount by which two cases who differ by one unit on *X* are expected to differ on *Y* through *X* 's effect on *M*, which in turn affects *Y*. The direct effect is interpreted as the part of the effect of *X* on *Y* that is independent of the pathway through *M*. (Hayes, 2009), p. 409.

The analysis will combine the causal steps approach by Baron and Kenny (1986) with a Sobel Test and boot strapping. A model illustrating the paths between variables is presented in figure 4.

The general steps for the proposed analysis follow and basic R code is included:

1. The full model is tested for assumptions.

Resilience = demographics [gender + age + sexual orientation + Race/Ethnicity + living arrangement] + duration of homelessness + social connectedness

2. After removing any outliers, the full model is run with the retained data to get path *b* and *c'*.

Resilience = demographics [gender + age + sexual orientation + Race/Ethnicity + living arrangement] + duration of homelessness + social connectedness

3. A total effects model without the mediator is run to get path *c*.

Resilience = demographics [gender + age + sexual orientation + Race/Ethnicity + living arrangement] + duration of homelessness

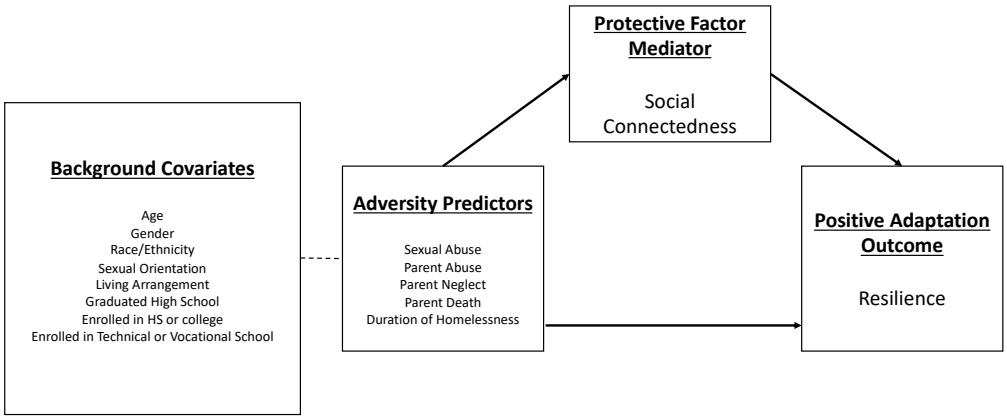
4. A model predicting *M* from *X* is run to get path *a*.

Social connectedness = demographics [gender + age + sexual orientation + Race/Ethnicity + living arrangement] + duration of homelessness

5. Indirect effect is calculated by multiplying paths *a* and *b*.
6. Sobel test to test the null hypothesis that the indirect effect *ab* is zero.
7. Bootstrapping (resample with replacement) is used to get indirect effects confidence interval.

Figure 5

The Adapted Analytical Model of Resilience in Youth Experiencing Homelessness



ASSUMPTIONS

Theoretical

The main theoretical assumption is that mediation analysis is not a formal test of causality.

Statistical

1. There is a linear relationship between the outcome variable and the independent variables.
2. Residuals are normally distributed (Multivariate normality).
3. Independent variables are not highly correlated with each other (No multicollinearity).

4. The variance of error terms are similar across the values of the independent variables (Homoscedasticity).

Chapter 4: Findings

DESCRIPTION OF SAMPLE

The sample consisted of 269 adolescents. A total of 155 participants came from Ohio and a total of 111 participants from Texas. Participants were 18-24 years of age, 58% (158) were male and 42% (112) were female. Sixty-five percent of the total sample identified as Latino/Hispanic, 17% as White, 12% as Black. Fifty percent of the males identified as straight, and 9% identified as having an alternate sexual orientation. Twenty-one percent of females identified as straight and 21% identified as having an alternate sexual orientation. Four adversities of homelessness were examined: (1) sexual abuse (56%, n=118); (2) parental abuse (28%, n=); (3) parental neglect (31%, n=84); (4) death of a parent (11%, n=29) in addition to duration of homeless (time away from family).

DESCRIPTION OF MEASURES

Table 4 describes the theoretical scaled measures used for analysis.

Table 3

Table of Theoretical Scaled Measures

Variable Name	Cronbach's alpha	Mean	SD	Min	Max
Social Connectedness	0.79	20.02	6.42	7	35
Hope	0.77	37.22	7.96	6	48
Optimism	0.72	21.55	8.5	0	46
Future Time Perspective	0.73	23.17	6.27	0	28
Resilience	0.86	143.33	18.05	80	173

DESCRIPTION OF ANALYTIC PROCESS

Analysis began by computing measures of association between the variables. Next, a series of linear regressions were run to understand the capacity of the independent variables to predict resilience. The regression models differed with the inclusion of psychological capital variables. These were included in an attempt to improve the mediation analyses after exploratory mediations revealed that social connectedness did not function as a mediator. A final, parsimonious regression model that included the adversity indicators, psychological capital, social connectedness and resilience was created to use in the mediation analyses. The final step in the analysis was to run a series of mediation models to understand if any independent variables functioned as a mediator.

RESEARCH QUESTION ONE

Correlation and linear regression were the methods chosen to answer the first research question: *Among adolescents 18-24 years of age who are experiencing homelessness, while controlling for demographics, what are the relationships among sample characteristics, adversity indicators, protective factors and resilience?* Background covariates were summarized using frequency and percentages (Table 4), providing an uncorrected look at each of the covariates predicting resilience. The Kruskal-Wallis is a non-parametric test of significance and tests the significance of the categorical predictor against the outcome of resilience. Adversity predictors, social connectedness and resilience were correlated using Pearson's method (figure 5).

Table 4

Summary of Associations between Categorical Variables and Resilience in a Study of Youth Experiencing Homelessness

Variable	Female		Male				
	N	% total	N	% total	df	Kruskal-Wallis (*H*)	*P-value*
Age					6	*H* (6) = 7.076	0.314
18	14	5	13	5	1	*H* (1) = 0.119	0.729
19	20	7	26	9	1	*H* (1) = 1.765	0.184
20	19	7	19	7	1	*H* (1) = 0.1631	0.686
21	12	4	19	7	1	*H* (1) = 0.177	0.674
22	20	8	23	9	1	*H* (1) = 0.688	0.407
23	17	6	35	14	1	*H* (1) = 2.7008	0.1003
24	8	3	15	5	1	*H* (1) = 3.5143	**0.061**
Gender	112	41.6	157	58.3	1	*H* (1) = 5.82	**0.016**
Race/Ethnicity					5	*H* (1) = 13.507	**0.019**
American Indian	0	0	2	1	1	*H* (1) = 0.1149	0.735
Asian	3	1	4	2	1	*H* (1) = 5.169	0.023
Black	10	4	21	8	1	*H* (1) = 6.302	0.012
Latino/a	3	1	5	2	1	*H* (1) = 2.828	0.093
Latino/ Hispanic	77	29	96	36	1	*H* (1) = 0.0695	0.792

Table 4, continued

White	19	7	28	10	1	$H(1) = 0.0226$	0.881
Sexual Orientation					1	$H(1) = 7.387$	**0.007**
Straight	56	21	133	50	1	$H(1) = 7.387$	**0.007**
Other	55	21	24	9	1	$H(1) = 7.387$	**0.007**
Living Arrangement					6	$H(1) = 7.751$	0.257
In a shelter	12	5	11	4	1	$H(1) = 3.1033$	0.078
In jail, youth detention, or long-term residential housing	3	1	10	4	1	$H(1) = 1.225$	0.268
On the street/outdoors	19	7	42	16	1	$H(1) = 3.1636$	0.075
With adult friends in their house or apartment	38	14	38	14	1	$H(1) = 0.83$	0.362
With foster parents in their house or apartment	1	0.4	4	2	1	$H(1) = 0.0339$	0.854
With parents or relatives in their house or apartment	20	8	29	11	1	$H(1) = 0.099$	0.753

Table 4, continued

Other	18	7	22	8	1	H (1) = 0.7068	0.4
Graduated HS					1	H (1) = 0.0926	0.761
No	52	19	72	27	1	H (1) = 0.0926	0.761
Yes	59	22	85	32	1	H (1) = 0.0926	0.761
Enrolled in HS or College					1	H (1) = 0.705	0.401
No	96	36	140	53	1	H (1) = 0.705	0.401
Yes	15	6	14	5	1	H (1) = 0.705	0.401
Enrolled in Technical or Vocational school					1	H (1) = 0.835	0.361
No	109	41	150	57	1	H (1) = 0.835	0.361
Yes	2	1	4	2	1	H (1) = 0.835	0.361

A Pearson correlation matrix for linear variables is shown Table 5. Overall, correlations in this sample are weak and bidirectional. Social connectedness and resilience are weakly positively correlated r (283) = 0.27, $p < 0.05$. Parental abuse r (279) = -0.29, $p < 0.05$ and parental neglect r (281) = -0.25, $p < 0.05$ have a weakly negative correlation with social connectedness. Likewise, parental abuse and parental neglect also have a weakly negative correlation with resilience r (279) = -0.14, $p < 0.05$ and r (279) = -0.14, $p < 0.05$. Sexual abuse and parental abuse share a weak positive correlation r (275), $r = 0.32$, $p < 0.05$. Parental abuse and parental neglect are positively associated r (279) = 0.46, $p <$

0.05. Overall, sexual abuse, parental abuse and parental neglect are positively associated with each other and negatively associated with social connectedness and resilience.

Correlations between five psychological variables of hope, optimism, social connectedness, resilience and future time perspective were also calculated. These variables had positive weak to moderate correlations and were all significant at the $p < 0.05$ level. The strongest correlations were between resilience and hope, as well as resilience and future time perspective.

Table 5

Correlations for Adversity, Mediator and Outcome Variables in a Study of Youth Experiencing Homelessness

	1. Duration	2. Sexual abuse	3. Parental abuse	4. Parental neglect	5. Parental death	6. Social connectedness	7. Resilience	8. Hope	9. Optimism	10. Future Time Perspective
1.	**1.00**	0.03	0.18*	0.13*	0.08	-0.13*	0.01	-0.01	0.03	-0.02
2.	-	**1.00**	0.31*	0.22*	0.07	-0.14*	-0.18*	-0.15*	-0.03	-0.06
3.	-	-	**1.00**	0.48*	0.01	-0.28*	-0.14*	-0.17*	-0.12	-0.11
4.	-	-	-	**1.00**	0.06	-0.24*	-0.14*	-0.19*	-0.08	-0.10
5.	-	-	-	-	**1.00**	-0.05	0.07	0.03	-0.10	-0.01
6.	-	-	-	-	-	**1.00**	0.28*	0.36*	0.34*	0.29*
7.	-	-	-	-	-	-	**1.00**	0.62*	0.41*	0.57*
8.	-	-	-	-	-	-	-	**1.00**	0.36*	0.49*
9.	-	-	-	-	-	-	-	-	**1.00**	0.37*
10.	-	-	-	-	-	-	-	-	-	**1.00**

Note: * $p < 0.05$

A linear regression with all of the original variables was run to understand if any predicted resilience. Model 1 was significant $F(23, 220) = 2.322$, $p < 0.001$. In this model

living arrangement (on the street, with adult friends and other), as well as social connectedness significantly predicted resilience. However, none of the adversity indicators were significant. Model 1 has an R square of 0.1953 meaning the predictors account for almost 20% of the variance in resilience. Model 2 included the Model 1 predictors as well as hope, optimism and future time perspective. Model 2 was a better fit for resilience, F (26, 217) = 10.25, $p < .001$. The R square for Model 2 was 0.5513 and accounted for 55% of the variance in resilience. The Anova between Model 1 and Model 2 was F (3) = 57.37, $p < 0.001$.

Model 1:

resilience = Background [gender + age + sexual orientation + Race/Ethnicity + living arrangement] +

Education [graduated HS + enrolled in HS or college + enrolled in Technical or vocational training] +

Adversity [duration of homelessness + sexual abuse + parental abuse + parental neglect + parental death] +

social connectedness

In Model 2 the significant predictors included male gender, death of a parent, living on the street, living with parents, hope, optimism and future time perspective. However, social connectedness was not a significant predictor.

After the linear regression was completed for both Model 1 and Model 2, plots were analyzed to check the model assumptions. The assumption of linearity is met because the residuals "bounce randomly" around the 0-line. All observations have homoscedasticity and there are no outliers as measured by the Cook's distance.

Sequential regression was used to purposively test covariates to understand if the variables of interest significantly contributed more than the covariates alone in order to build a more parsimonious model. According to the method, a sequential regression was completed testing two models (Table 6). Model one tested the covariate with all of the predictors and the mediator, against the outcome variable. Model two tested each covariate independently against the outcome. Finally, an ANOVA was calculated to understand the difference between the two models.

Table 6

Sequential Regression results for First and Second Regression Models to Understand the Contribution of Psychological Capital

	Model 1	Model 2
(Intercept)	**157.63 *****	**146.01 *****
	(18.85)	(14.23)
Gender = male	2.42	0.85
	(2.61)	(2.00)
Age	1.84	0.44
	(1.19)	(0.90)
Sexual orientation = straight	1.89	-0.20
	(2.74)	(2.06)
Race/Ethnicity		
Asian	9.72	13.75
	(19.23)	(14.48)
Black	-14.55	-4.28
	(18.17)	(13.69)
Latino/a	-0.89	5.02
	(19.00)	(14.38)
Latino/Hispanic	-7.70	3.07
	(17.96)	(13.54)
White	-7.68	3.24
	(18.00)	(13.57)
Duration	-0.88	-0.29
	(1.22)	(0.92)
Adversity Predictors		
Sexual abuse	-3.12	-1.85
	(2.69)	(2.03)
Parental abuse	-0.93	0.17
	(2.96)	(2.23)
Parental neglect	-4.59	-2.82
	(2.80)	(2.11)
Parental death	4.40	**5.94 ***
	(3.71)	(2.81)
Living Arrangement		
In jail, youth detention, or long-term residential housing	-3.79	-7.22
	(6.38)	(4.83)
On the street/outdoors	-8.47	-6.18
	(4.65)	(3.54)

Table 6, continued

With adult friends in their house or apartment	-6.05	-2.75
	(4.43)	(3.36)
With foster parents in their house or apartment	-9.87	-3.39
	(9.36)	(7.05)
With parents or relatives in their house or apartment	**-10.08** *	**-7.81** *
	(4.75)	(3.63)
Other	-7.97	-2.96
	(4.86)	(3.71)
Education		
Graduated High School	-1.16	-0.44
	(2.31)	(1.74)
Enrolled in HS or college	5.16	-1.82
	(3.61)	(2.77)
Enrolled in technical or vocational training	9.84	4.23
	(8.83)	(6.66)
Social connectedness	**3.94** **	-1.16
	(1.19)	(0.99)
Hope		**7.09** ***
		(1.05)
Optimism		**3.42** ***
		(1.01)
Future time perspective		**5.63** ***
		(1.01)
N	244	244
R2	0.20	0.55

Note: All continuous predictors are mean-centered and scaled by 1 standard deviation.
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

A significant p-value for the ANOVA between the two models indicates the variables of interest contribute more than the covariate alone. No covariate significantly contributed to a model with adversity indicators, hope, optimism, future time perspective and social connectedness. However, the adjusted R-square decreased from 0.5248 in the model two to 0.4942 in the model with only adversity indicators and social connectedness, meaning covariates did account for a nominal 3% of the variance in resilience.

Model 3 was run with the covariates removed to capture a more parsimonious understanding of the relationships between adversity and psychological capital. Model three predicting resilience from hope, optimism, future time perspective, social connectedness and all adversity indicators was significant F (8, 253) = 30.92, p < 0.001 (Table 7). Of the adversity predictors, sexual abuse negatively impacted resilience t (8, 253) = -2.12, $p < 0.05$, and the death of a parent positively impacted resilience t (8, 253) = 1.98, $p < 0.05$. Psychological variables significantly contributed to the variance in resilience: hope t (8, 253) = 7.39, $p < 0.001$, optimism t (8, 253) = 3.27, $p < .001$, future time perspective t (8, 253) = 5.49, $p < .001$. Social connectedness was not a significant predictor of resilience in this model.

Model 3:

Resilience = Adversity [Duration of Homelessness + Sexual Abuse + Parental Abuse + Parental Neglect + Parental Death] +

Hope + Optimism + Future Time Perspective + Social Connectedness

Table 7

Linear Regression Results for a Parsimonious Model That Excludes Background Covariates

	Model 3
(Intercept)	144.42 ***
	(1.20)
Sexual Abuse	**-3.65 ***
	(1.72)
Parent Abuse	0.85
	(2.10)
Parent Neglect	-1.35
	(1.98)
Parent Death	**5.12 ***
	(2.59)
Hope	**7.24 *****
	(0.98)
Optimism	**3.00 ****
	(0.92)
Future Time Perspective	**5.22 *****
	(0.95)
Social Connectedness	-0.62
	(0.91)
N	262
R2	0.49

Note: All continuous predictors are mean-centered and scaled by 1 standard deviation.
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

RESEARCH QUESTION TWO

Mediation analysis was used to answer the second research question two: *Among adolescents 18-24 years of age who are experiencing homelessness, what is the effect of social connectedness on the relationship of adversity to resilience?* The mediation analysis was completed using the R Package for Causal Mediation Analysis (Tingley, Yamamoto,

Hirose, Keele et al., 2019). The traditional approach to mediation by Baron and Kenny (1986) has four steps:

Step 1: Show the causal variable (X) is correlated with the outcome (Y). The first model calculates the total effect by predicting the dependent variable from the independent variable.

Step 2: Show the causal variable is correlated with the mediator variable by treating M as an outcome.

Step 3: Show the mediator affects the outcome variable by using both X and M as predictors for Y.

Step 4: To establish that M mediates the X-Y relationship, the effect of X on Y controlling for M should be zero.

Tingley et al. (2019) update this process somewhat. Understanding that the total effect decomposes into causal mediation effects and direct effects, he defines a two-step process. First, a mediator model and an outcome model are specified and fitted separately. The outputs from these two models are used as the input to the `mediate` function that computes the average causal mediation effect (ACME) and the average direct effect (ADE). Next, a sensitivity analysis was conducted to test the assumptions.

Research question two asked if social connectedness mediates the relationship between adversity and resilience in a population of adolescents experiencing homelessness. The demographic covariates were excluded from the mediation process in order to simplify analysis because no demographic covariate significantly contributed to the model of adversity indicators and social connectedness predicting resilience during sequential regression. The mediation models included all adversity indicators, hope, optimism, and future time perspective. The `mediate` function was used to estimate average causal mediation effects (ACME), and average direct effects (ADE) with simulations were set to

1000 to calculate the uncertainty estimates. Nonparametric boot-strapping was used for variance estimation, and a summary was produced by R that calculated point estimates, confidence intervals and the *p*-values for the average direct, indirect and total effects.

The mediator model (`med.fit`) and the outcome model (`out.fit`) used both the adversity variables and the mediator variable to predict the outcome variable of resilience (`res`). A series of models tested the adversity variables in different positions to understand the linear relationships.

Social Connectedness = Duration of Homelessness + Sexual abuse + Parental abuse + Parental death + Hope + Optimism + Future Time Perspective

Resilience = Duration of Homelessness + Sexual abuse + Parental abuse + Parental death + Hope + Optimism + Future Time Perspective

Mediation analysis can be significant without a total effect because "the lack of correlation does not disprove causation" (Bollen, 1989, p. 52; Hayes, 2018, p. 80). However, any meaningful result must have a direct effect between the predictor and the outcome. The first series of models tested social connectedness as the mediator and resilience as the outcome. Mediations were completed for all of the adversity predictors, and all of the remaining psychology variables and no model had both significant ACME and ADE. This means that social connectedness did not function as a mediator for resilience in any of the models tested.

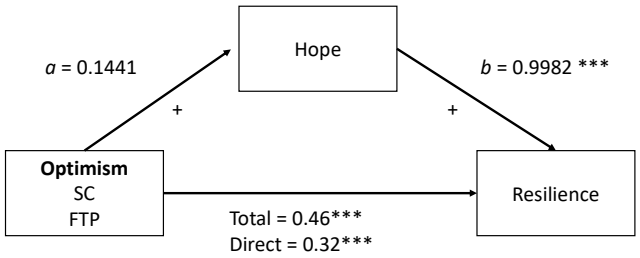
Given the relatively strong associations between the psychology variables, a second series of models focused on the psychological predictors alone to understand how they interrelated. Social connectedness was tested in both the mediator and treatment roles, and neither model was significant; however, hope, optimism and future time perspective were

more significantly associated with resilience and each functioned as a mediator in their respective models.

The model with hope mediating the relationship between optimism and resilience was significant F (4, 278) = 68.43, $p < 0.001$ (Figure 6). This model shows the effect of optimism on resilience was partially mediated by hope. The ACME is 0.1442 for the model with bootstrapped 95% confidence intervals of 0.058 to 0.26. The mediation effect of the model was significant $p < 0.001$ as shown in Figure 6. The proportion of the effect of optimism that goes through hope in the model is 0.3123, $p < 0.001$.

Figure 6

Hope as a Mediator in the Relationship Between Optimism and Resilience in Youth Experiencing Homelessness



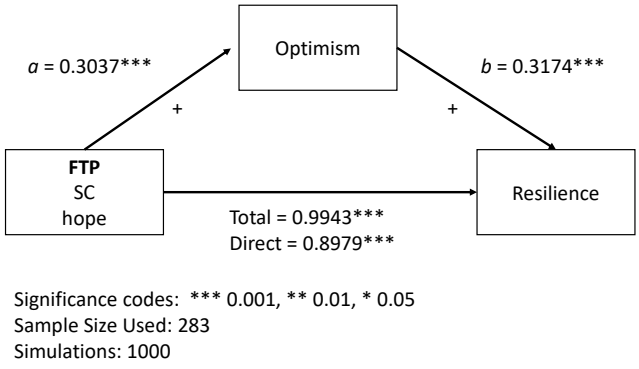
Significance codes: *** 0.001, ** 0.01, * 0.05
Sample Size Used: 283
Simulations: 1000

In a second model, optimism mediated the relationship between future time perspective and resilience (Figure 7). This model shows the effect of future time perspective on resilience was partially mediated by the effect of optimism. The ACME for the model is 0.964 with bootstrapped confidence intervals of 0.0277 to 0.19. These confidence intervals are significant at $p < 0.001$ as shown in Figure 7. The proportion of

the effect of future time perspective that goes through optimism in this model is 0.0970, $p < 0.001$.

Figure 7

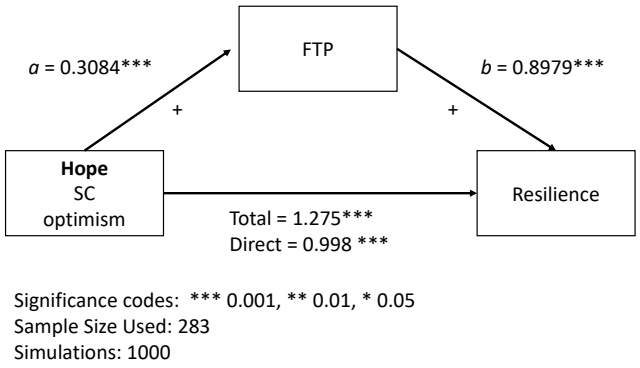
Optimism as a Mediator in the Relationship Between Future Time Perspective and Resilience in Youth Experiencing Homelessness



The final model (Figure 8) showed future time perspective mediating the relationship of hope and resilience. This model shows the effect of hope on resilience was again partially mediated by future time perspective. The ACME for this model is 0.277 with bootstrapped confidence intervals of 0.15 to 0.43. This indicated the mediated effect is significant at $p < 0.001$ level as shown in Figure 8. The proportion of the effect of hope that goes through future time perspective is 0.217, $p < 0.001$.

Figure 8

Future Time Perspective as a Mediator in the Relationship Between Hope and Resilience in Youth Experiencing Homelessness



RESEARCH QUESTION THREE

The third research question examined the effect of adversity on resilience. Linear regression was used to answer the specific question: *among adolescents 18-24 years of age who are experiencing homelessness, what is the effect of past adversity on resilience?* Model 1 and Model 2 (Table 6) both included adversity predictors and covariates, but adversity was not a significant predictor of resilience in either model. Model 3 was the parsimonious model that excluded the covariates. Model 3 was significant F (8, 253) = 30.92, $p < 0.001$, and sexual abuse negatively predicted resilience t (8, 253) = -2.119, $p < 0.05$ in the model. However, death of a parent was positively associated with resilience t (8,253) = 1.978, $p < 0.05$. Although both sexual abuse and death of a parent significantly impacted resilience, there was no direct relationship between either variable and resilience in the mediation models completed to answer question two.

SUMMARY

Chapter four presented the methods used to answer the research questions. Research question one used bivariate correlations and linear regression to understand the relationships among sample characteristics, adversity indicators, protective factors and resilience. Research questions two asked the effect of social connectedness on the relationship of adversity to resilience. A mediation analysis showed that social connectedness did not mediate the relationship between adversity and resilience. Research question three examined the effect of adversity on resilience. In the parsimonious model sexual abuse negatively predicted resilience, and death of a parent positively predicted resilience. Finally, mediation was also used to explore the relationships between the psychology capital variables of hope, optimism, resilience, social connectedness and future time perspective. These mediation models showed that hope, optimism and future time perspective functioned as mediators in their respective models with resilience as an outcome, but there was no direct relationship between social connectedness in the mediation and it did not function as a mediator.

Chapter 5: Discussion

Adolescents experiencing homelessness are complex and it is inherently difficult to understand the reality of that complexity. As nurses work with these youth individually they are able to assess the reality, plan and help. But understanding the complexity from a distance is a very real challenge for both nursing and social science scholars. Scholars are tasked with distilling known elements of a very complex system into a complicated model that can be analyzed. This means bringing the knowledge from the regime of complexity into the ordered regime. These models, in turn, can be used to study mechanisms and give insights into systems. Ultimately, the goal of this research was to understand if the traditional variable-based approach to analysis would be adequate to explain that complexity. More broadly, the analysis supports the important role that social connectedness and psychological capital have for youth experiencing homelessness and their path toward developing a meaningful life and becoming contributing members of society.

While the bulk of the literature surrounding adolescents experiencing homelessness addresses the negative impacts of adversity on outcomes like psychopathology, I wanted to contribute to the body of literature refuting the inevitability of this outcome. Likewise, I also wanted my model to reflect the background and context of these youth. Data from studies of this population suggest that many adolescents who experienced homelessness were able to leverage protective factors and to develop coping skills to achieve resiliency. I wanted to understand if I could model this phenomenon as a pathway to resilience. Therefore, the analysis examined the relationships between variables in order to understand how social connectedness functioned as a protective factor for adolescents experiencing homelessness. Given this goal, the study asked three research questions: (1) Among

adolescents 18-24 years of age who are experiencing homelessness, while controlling for demographics, what are the relationships among sample characteristics, adversity indicators, protective factors and resilience? (2) Among adolescents 18-24 years of age who are experiencing homelessness, what is the effect of social connectedness on the relationship of adversity to resilience? (3) Among adolescents 18-24 years of age who are experiencing homelessness, what is the effect of past adversity on resilience?

RELATIONSHIPS BETWEEN SAMPLE CHARACTERISTICS, ADVERSITIES OF HOMELESSNESS, PROTECTIVE FACTORS AND RESILIENCE

A multi-step process was used to understand these relationships. First, associations between the variables were explored using two tests of association. Next, linear regression was used to understand the predictive impact of the variables on resilience. Finally, mediation was used. Implications for the role of social connectedness and adversity are discussed.

Covariates were used to give insight to the background and contextual factors known to be associated with adolescents experiencing homelessness. Covariates alone model paint two common pictures. The first is of a 23-year-old Latino/Hispanic straight male. He is more likely to live on the street than with adult friends. He is a high school graduate and is not currently enrolled in school. The second is of a 22-year-old Latino/Hispanic female. She is as likely to be straight as not. She is most likely to live with adult friends; but if not there, is as likely to live on the street as with her parents. She is also a high school graduate and is not enrolled in school.

Resilience is a psychosocial state that is strongly correlated with other psychosocial variables like optimism, humor, mental flexibility, self-efficacy and perceived stress. During the initial proposal these variables were not included, but after exploring the data,

I decided to include additional psychological capital variables in the analysis (Gomez, Vincint & Toussaint, 2013; Lutha & Cicchetti, 2000). Youth strengths measured in this study included hope, optimism and future time perspective in addition to social connectedness and resilience. Future time perspective has been linked with affective and behavioral outcomes (Guthrie, Butler and Ward; 2009) and is associated with less risk-taking behavior (Stoddard, Zimmerman and Bauermeister, 2011). Evidence from young people who maintain hopeful and optimistic views of the future indicates they are less likely to engage in problem related health behaviors (Morselli, 2013; Seginer, 2008).

This study found that straight, older males were most likely to be resilient. Youth experiencing homelessness are a marginalized population. Older males may be more resilient because age is associated with more life experience and these youth have had more time to develop problem solving skills. It is also possible that straight males are more resilient because they face less stigma and discrimination that those who do not identify as straight. Data from studies of LGBT young adults experiencing homelessness show that these youth have been rejected by family, have been attacked physically, treated unfairly, made to feel unwelcome in places of worship and were the target of slurs or jokes (Choi et al., 2015). Although it is likely straight youth experiencing homeless have similar experiences, being a member of the majority group helps adolescents 'fit in'; and those who 'fit in' are less likely to feel isolated or rejected (Crosnoe, 2011). More data is available about sexual orientation and reasons for homelessness in this study that merit further research and investigation.

These results are consistent with the literature that shows youth who feel connected to people and institutions in their community may be buffered from other risk factors like abuse and neglect (Foster et al., 2017). The results are also consistent with the literature that supports a connection between social connectedness and psychological capital in this

population of adolescents experiencing homelessness (Dang, 2014; Dang & Miller, 2013; Rew & Horner, 2013). This may imply that many of the youth who had experienced abuse and neglect did not have a significant tie to an adult aside from their parent. This warrants further investigation.

Linear regression was also used to analyze the predictive impact of several different variables on the outcome of resilience. In the first model *without* the psychological capital variables, social connectedness had the most significant impact on resilience. These findings are consistent with the literature suggesting that the presence of a significant positive relationship with an adult supports resilience (Ungar, 2008). Two categories of living arrangement were also significant and negatively predicted resilience. This likely reflects the lack of stability — parental support, role models and continuity of residence and schools — adolescents need to succeed (Sandstrom & Huerta, 2013). Youth experiencing homelessness have trajectories that include a history of family instability and disruptions marked by parental struggles with substance use, chronic unemployment, and poverty. This research backs the research that an unstable home environment does not support resilience.

Research question one asked about the relationships between covariates, adversity indicators, psychological capital, social connectedness and resilience. In the final linear model, background covariates did not significantly contribute to the variance in resilience. However, adversities of homelessness, psychological capital and social connectedness were significant variables in the model. Curiously, adversity could affect resilience in both a positive (parental death) or a negative (sexual abuse) direction, implying different types of adversity can have different roles in the development of resilience. The positive effect of death of a parent is consistent with the literature about adversity's role in resilience. Dienstbier proposed a theory of toughness (1989, 1992) that postulates adversity can have

a toughening effect when the adversity is limited and there is opportunity for recovery. This is similar to steeling in Rutter's model (1987). Death of a parent may have provided youth an opportunity to develop coping strategies that could be transferred to other domains (Seery & Quinton, 2016). Whereas, sexual abuse may represent a more chronic, persistent adversity. The negative effect of sexual abuse on resilience in this study may illustrate the maladaptive responses that can undermine resilience.

In the United States, 3.5% of young adults have lost a parent before the age of 18 (Herberman, 2013). In a report of adolescents experiencing homelessness by researchers at the University of Chicago, up to 35% of young adults had experienced the death of a parent or a primary caregiver (Samuels et al., 2019). In the current study, 11% had experienced the death of a parent. When young adults experience this adversity and have access to supportive adults who are willing to assume the roles of the deceased, they may be protected, less likely to develop maladaptive coping strategies and have decreased future need for health care services (Marwit, 1998).

The linear regressions pointed to the potential role of both psychological capital and social connectedness as protective factors to modify the effect of adversities of homelessness on resilience.

SOCIAL CONNECTEDNESS

Linear regression and mediation were used to understand the specific effect of social connectedness on the relationship of adversity to resilience. Social connectedness was significant in the first linear model t (23, 220) = 3.23, $p < 0.01$, but was no longer significant in the second model with the psychological capital variables. The Pearson correlation between social connectedness and resilience was 0.28, much lower than correlations between resilience and hope (0.62), or resilience and optimism (0.41). This

means that both social connectedness and psychological capital explain the variance in resilience, but linear regression does not have the statistical power to untangle the effects.

Mediations were run with each adversity indicator individually using social connectedness as a mediator and resilience as the outcome and no model had a significant mediated effect for social connectedness. According to Hayes (2009) and Zhou (2010) it is possible to have a mediation without a significant total effect (the effect of the independent variable on the outcome variable). However, there must be a significant direct effect of the predictor on the outcome, as well as a significant effect of the mediator on the outcome to have a mediation. In the specific case of the adversity predictors (sexual abuse, parental abuse, parental neglect, death of a parent and duration of homelessness (time away from family) predicting resilience, social connectedness did not function as a mediator. In all but one of the mediations, there was no direct effect or total effect. In the mediation with death of a parent as a predictor, a significant direct effect of 5.58 was present with bootstrapped confidence intervals of 1.25 to 10.13. That mediation with death of a parent as a predictor and social connectedness as a mediator also had a significant total effect of 5.62 with bootstrapped confidence intervals of 1.29 to 10.33. This connection merits further research into the nature and type of adversity and those effects on resilience. Mediation tests a very specific type of linear relationship between variables that function in specific roles. Without simultaneous correlations between the predictors and the outcome and between social connectedness and resilience, there is no indirect or mediated effect in this sample. Therefore, social connectedness could not function as a mediator for resilience even though research has pointed to the relationship between social connectedness and resilience. A more nuanced statistical method that can uncover the nature of the relationships between predictors may be more appropriate in this type of analysis.

Previous research has associated social connectedness and resilience. Dang studied social connectedness in youth experiencing homelessness and found that youth who felt more connected with their families, schools and prosocial peers reported better mental health despite histories of parental maltreatment (2014). Unlike the current analysis that used a composite measure of social connectedness, she measured each social connectedness dimension with a separate tool and used mental health state as the outcome. Additionally, she used separate regression analyses for each of the predictor variables. This technique made for stronger associations between the variables of interest allowing for significance. The current analysis included all of the independent predictors in a single regression model with resilience as the outcome. This introduced more error and decreased significance.

The lack of significance for social connectedness as a mediator can happen for many different reasons. Zhou (2010) discussed the competitive nature of relationships in mediation models. In cases where the predictor is negatively correlated with the outcome (path c) and the indirect path (a x b) is of the opposite sign, the mediator must be more significantly correlated to overcome the effect to be mediated. Another explanation for the lack of significance centers around the concept of measurement error. All of the data in the study is self-reported and the youth answered questions based on their understanding. However, they may have misunderstood the questions about social connectedness, or the specific types of social connectedness tested were not a salient to the youth experiencing homelessness as other types of social connectedness like peer relationships.

A third explanation for the lack of significance of social connectedness as a mediator may be related to the variable centered approach of this method. Adversity is a broad phenomenon known to be associated with adjustment difficulty (Luthar & Cicchetti, 2000). Social connectedness is an interpersonal measure that can function as both a

protective and a risk factor for risk taking behaviors (Kidd & Shahar, 2008). Findings from a study by Rew et al. (2016) support the role of social interaction in building psychological capital in young women experiencing homelessness. Greater social connectedness has also been associated with improved resilience in young adults (Gooding et al., 2012) and those results were supported by this analysis. Among most adolescents and young adults, social support protects against stress by enhancing self-esteem, increasing their perceived control, or strengthening their sense of security. This shapes behavior. However, for young adults experiencing homelessness the day-to-day stressors involved with survival may detract from the importance of the social connectedness, and, what is usually a protective factor may be unable to explain the variation in resilience shown by youth experiencing homelessness. This makes social connectedness as a mediator a more difficult case to support. Mediation is a variable based, linear method of analysis. When factors have different types effects, those effects may be better represented with other modeling techniques.

I questioned if social connectedness mediated the relationship between adversity and resilience based on the postmodern assumption that knowledge is mediated by social interaction. It is likely this is the case, but linear regression and mediation were unable to untangle those relationships. Future research with this dataset and population could analyze different adversity indicators like a measure of current stress, or a measure of cumulative stress. Additionally, more advanced statistical methods like structural equation modeling or latent class analysis may be useful to provide more meaningful results.

ADVERSITIES OF HOMELESSNESS

Masten and Coatsworth (1998) identified current or past significant risk or adversity as a precondition for resilience. The purpose of this research question was to

determine if a linear relationship exists between adversity and resilience. Five adversity indicators were chosen based on a review of the literature (sexual abuse, parental abuse, parental neglect, death of a parent and duration of homelessness). In the first linear model without the psychological capital variables no adversity indicators predicted resilience. In Model 2 with psychological capital variables included death of a parent was significant predictor of resilience. Patterson and Garwick (1994) studied family dynamics and resilience in families in which a parent had died and found that families who viewed the crisis as comprehensible, manageable and meaningful were able to adapt and develop resilience. For adolescents currently experiencing homeless, the previous experience of death of a shaped the way they developed strengths like self-efficacy and resilience.

A third model was analyzed that excluded the background covariates because none significantly contributed to the outcome of resilience. This model was significant. In this model, sexual abuse negatively predicted resilience and death of a parent positively predicted resilience. This finding supports the theory that some exposure to adversity fosters resilience by toughening (Dienstbier, 1989, 1992) or steeling (Rutter, 1987) individuals. Toughness is similar to physical fitness in that exertion followed by a recovery period increases strength and endurance. In this way of thinking, a moderate amount of stress that is sufficiently challenging to be coped with creates the opportunity for individuals to develop self-efficacy. Survivors of some amount of childhood adversity also had internal factors of hope and optimism that predicted resiliency (as defined by a lack of psychopathology) (Domhardt et al., 2014). Like those children who learned to cope with the death of a parent, the children who survived adversity developed problem focused strategies that were associated with adaptive functioning on academic, behavioral and social levels (Chaffin, Wherry & Dykman, 1997; Patterson & Garwick, 1994). Hope,

optimism and future time perspective were significant predictors of resilience in this model as well.

The mixed effect of adversity on resilience is first related to the adversity indicators chosen for analysis. The five adversity indicators in this analysis were chosen based on a review of the literature. However, they did not represent the full range of adversities experienced in this population. Seery et al. (2010) identified six broad categories of adversity: own illness or injury, loved one's illness or injury, violence, bereavement, social/environmental stress, and relationship stress. Lines (2020) included two additional categories: threat/harassment and other's death or injury. When we consider the cumulative effect of adversity over time, and the multidimensional reality of adversity, the five indicators chosen could not give a comprehensive understanding of adversity. Adversity can have a cumulative effect on resilience and wellbeing, as well as an effect at the moment in time (Lines et al., 2020). This leads to an understanding that adversity has different roles in different populations at different times and that the state of resilience is context- and time- specific.

The mixed effect may also be related to the method of analysis. Linear regression was the primary method used to answer this research question. It is likely that many adolescents in this study experienced more than one adversity based on the significant correlations between the adversity indicators. Polytraumatization may be a more realistic understanding of adversity because most people experience more than a single trauma or adversity, and most also experience more than one type of trauma or adversity in their lifetime (Carlson et al., 2011, Higgins & McCabe, 2001). Polytraumatization is the cumulative or interactive effects of the traumas and adversities on downstream outcomes (Gustafsson et al., 2009). Regression is a variable based approach to understanding the

direct effect of adversity on resilience and reflected a single-trauma model that obscures the understanding of how adversities interact to affect resilience.

Finally, the weak associations between duration of homeless and resilience in this study is likely because duration of homelessness was actually measured as time away from family. The passage of time, in itself, does not mean that a process will commence. Distance from family also gives time for other adversities like finding a place to sleep, or finding food to eat, to become more salient to these youth. This warrants further investigation.

PSYCHOLOGICAL CAPITAL

Psychological capital is a multidimensional construct that includes hope, efficacy, resiliency and optimism (Luthans, Youssef & Avolio, 2007). These four measures implicitly reflect one's positive appraisal of circumstances and probability for success based on motivated effort and perseverance at the individual level (Luthans, Avolio, Avey & Norman, 2007). Hope, optimism and future time perspective were added to the analysis after the proposal in an effort to better understand the phenomenon of resilience.

In the mediations without adversity the relationships between social connectedness, hope, optimism, and future time perspective were easier to explore. The three different mediations showed three different direct paths to resilience all measured at a single point in time. The different mediations point to the interrelatedness of hope, optimism and future time perspective on the outcome of resilience and generally supports the work by Seligman (2000). I conceptualized resilience as a state to focus on the process, yet there is debate about whether it is a trait. Research by Li et al. (2020) explored the construct of psychological capital to show how emotional resilience mediated the relationship between negative life events and mood, shifting the analysis somewhat. Further research is

necessary to explore the nature of psychological capital and to untangle the roles of the various concepts (hope, optimism, etc.) to understand if they function as states or as traits predictive of wellbeing. This points to a potential complexity in the system that cannot be adequately explained by either linear regression or mediation.

COMPLEXITY

This analysis was grounded in philosophical complexity, yet that framework may be difficult to ascertain. Figure 2 showed Ashby's law in three regimes. This represents one way scholars can think about knowledge in a complex system. Theory and research create ways of thinking about information that bring it from the chaotic regime into the complex regime. One goal of this study was to bring that knowledge from the complex regime into the ordered regime.

In Lerner's resilience model (Figure 2), the relationship between ecological context and youth strengths is bidirectional. These interact together and contribute to the proximal developmental outcome. The resilience process is activated by individual agents engaging with resource giving ecologies (Wright, Masten & Narayan, 2013). Both the agent and structure interact. While a rich social ecology is necessary to provide resilience-enabling resources to the individual, the individual adolescent must also exercise agency to navigate her way toward resilience (Ungar, 2011). I questioned that social connectedness mediated the relationship between ecology and youth strengths based on the postmodern assumption that knowledge is mediated by social interaction. It is likely that historical adversity shapes the way adolescents develop coping strategies and strengths. It is also possible that those strategies and strengths are shaped by current adversities like perceived stress and that the state of resilience is context- and time- specific.

Cillers (1998) describes a complex system as one with non-linear interactions between agents who self-organize and make decisions with locally available information. Benbya and McKelvey (2011) model this system with bifurcations and feedback loops that create the conditions for three different states to emerge: a stable state that is predictable, a chaotic state that is random and uncertain, and an in-between state called the edge of chaos. Psychological states like resilience, hope and optimism emerge from the processes that occur at the edge of chaos and are theoretically nonlinear. Psychological states result from continuous change where small adaptations accumulate and a new pattern of organizing emerges in the individual. Adaptations emerge as adolescents interact with their social ecology and learn. The individual states (e.g. hope, optimism, resilience) can accumulate, gather momentum and become transformative within the individual creating a new mindset and way of thinking. This transformation leads to tightened connections between psychological states within the individual: meaning both positive and negative feedback play an important role in change. Positive feedback reinforces the initial adaptation and allows small adaptations to accumulate. Negative feedback plays a role as a stabilizing mechanism that balances the positive feedback. That mindset likely colors the salience of social connectedness for the individual and therefore, the ability of social connectedness to function as a mechanism.

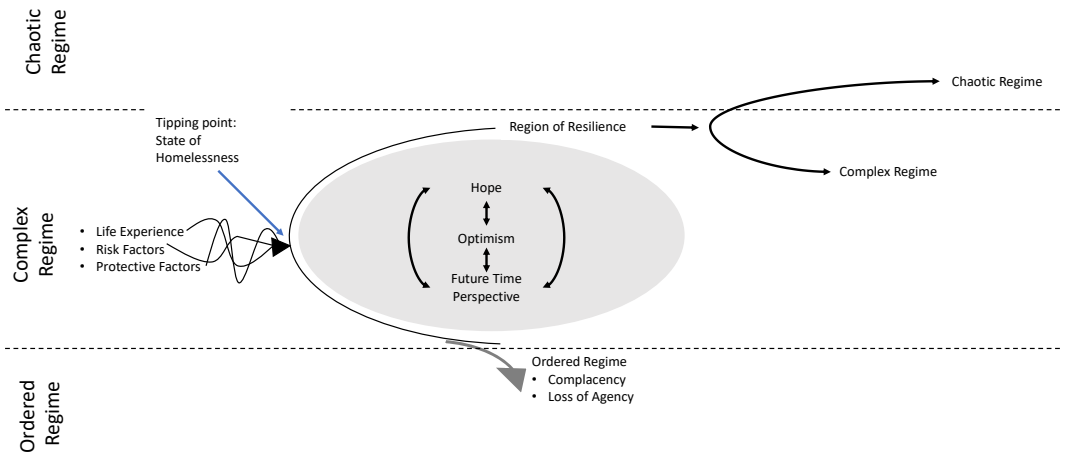
Using this framework, resilience may be viewed as a non-linear process. Although mediation is a fundamental method in pathway analysis, it necessarily simplifies relationships between the variables. It showed a positive relationship in this analysis, but it did not tell whether this was because of feedback or just part of the structure because an assumption of the method is that the pathway moves forward unidirectionally and sequentially in the ordered regime. The three models shown in Figures 6, 7 and 8 show this in a simplified manner. However, the models also represent three different pathways

to resilience that occur simultaneously. Although it is possible to make the mediation model more complicated to account for more interactions, multiple mediators and covariates, a single mediation will never be able to account for the interactions that are likely present in the mindset and process of resilience. This points to a need to use more advanced statistical methods like structural equation modeling or latent class analysis that can model a more person-centered approach to the relationships between adversity, psychological capital, social connectedness and resilience.

Figure 9 shows a new model of resilience grounded in complexity that shows some of the bifurcations and a potential feedback loop. The youth's life experience, risk and protective factors (Figure 4) feed into a short-lived stable state. The twisted lines in the path illustrate the assumption that these factors interact nonlinearly and have a cumulative effect over time that results in some type of a behavior. The first critical value is the moment the youth self-identified as homeless. Resilience becomes an interactive process where the facets of a positive mindset potentially interact with feedback loops. This may imply that hope, optimism and future time perspective feedback on each other positively, destabilizing the previous equilibrium and shifting the system into disequilibrium. However, complexity says there must also be a counteracting negative feedback loop that stabilizes the system. This points to an interaction between positive psychology and another construct like social connectedness that shift the course of the system over time. Future research with this framework may lead to a better understanding of the relationships between adversity, social connectedness, and psychological capital in this population of adolescents experiencing homelessness.

Figure 9

Resilience as a Complex System for Youth Experiencing Homelessness



LIMITATIONS

This study was a secondary analysis. Therefore, a significant limitation is the fact that all data are from self-reported measures, designed for a different set of research objectives and out of the control of the current analysis. For example, the adversities of homelessness chosen for analysis did not reflect the cumulative adversity these adolescents have experienced, and the measure of social connectedness did not include a measure of peer relationships. Overall, I was limited by the way concepts and constructs were operationalized in the parent study. I theoretically considered the system to be complex, yet I chose to use linear statistics. Analyzing the model with linear regression and mediation may have been overly simplistic because these methods are unable to

disentangle the relationships between the predictors, yet it was a necessary first step to illuminate the relationships.

IMPLICATIONS FOR FUTURE RESEARCH

This study was a quantitative, empirical analysis of variables that were correlated with and that predicted resilience in a population of adolescents experiencing homelessness. I focused on a limited number of adversity indicators and did not consider current stressors that may have better associations with resilience. This suggests further study about adversities of homelessness (i.e. types of adversities, interactions, cumulative effects) will benefit the body of knowledge surrounding adolescents experiencing homelessness. In addition, resilience is only one part of psychological capital. Rather than focusing on a pathway toward resilience, it might be more beneficial to understand how the facets of psychological capital interact to impact distal outcomes like life satisfaction. Also, the role of psychological capital and its role as both a state and a trait should be examined. It is likely it can function as both a state and a trait in different situations. Without further research we will be unable to understand the impact this approach can have on adolescents. The role of social connectedness as a protective factor bears further research. Social connectedness is associated with resilience and the current study was unable to completely understand the relationships, likely because of the methods chosen and the measure of social connectedness used in the parent study.

Future analysis with this dataset should include some measure of perceived stress and its relationships with psychological capital. In order to build on inherent strengths, future analyses should broaden to include the relationship between intervention and psychological capital variables.

IMPLICATIONS FOR NURSING PRACTICE

Embracing positive psychology means shifting nursing practice focus from clinical outcomes to wellbeing. This shift to wellbeing also demands more from nurses. They are challenged to establish relationships with patients, ask about feelings and validate emotions. Nurses work in a variety of roles (primary care clinic, school, emergency) that interface with adolescents. In these roles they must broaden their focus from the clinical manifestation of specific symptoms to the assess adolescent's local environment. They must go beyond treating their role as a series of tasks to be completed and think of how a particular situation at a specific moment in time fits into the entire life course of the individual.

When working with patients nurses should adopt a strengths-based, positive, "can-do" mindset to help them learn to manage their health conditions. This speaks to the idea of patient-centered care and working with patients and families to identify resources and develop strategies rather than simply educating the patient to implement a prescribed regimen. It also means working to identify networks and social support to link care beyond the walls of the specific location of care.

In the case of managing adversity nurses must work with the adolescents to understand the adversities as well as the salience that adversity has. Within the nurse-patient relationship, nurses must be open, sensitive and non-judgmental when working with the adolescent. They must acknowledge and validate emotions to help the adolescent understand the adversity and place it in context. That means working to identify coping strategies that might be maladaptive and those that can foster resilience. In the specific case of parental death nurses must go beyond the Kubler-Ross stages of grief taught in nursing school to recognize complicated grief (Zisook, 2014) and understand when to refer to a mental health practitioner or counselor.

Additional research about positive psychology is necessary to develop nursing educational curriculums that teach nurses more about how to develop and manage psychological health and wellbeing. Nurses are key members of the team who can deliver these interventions and apply knowledge learned from studies to their practice.

IMPLICATIONS FOR HEALTH POLICY

Adolescents must have access to resources in order to flourish (Earls & Carlson, 2001; Rutter, 2012) and health policy should work to help families build capacity and capability to create that environment. There is a dearth of pediatric and adolescent mental health professionals who are available to help adolescents and families build that environment. Therefore, we must train additional mental health professionals like mental health nurse practitioners and build capacity. There is also a need to develop trauma informed care standards for educators, social service providers and other healthcare providers.

Psychological capital affects many life domains including work, relationships and mental health. Therefore, policies that can enhance psychological capital will improve well-being and productivity in members of society. Key policy levers include funding in the form of community investments, health care transformation and redesigning the workforce. Past community investments have included Delivery System Reform Improvement Payments. These are federal programs that provide funding to states that can be used to test and implement innovative ways to provide care. One program in Austin paid for a group of community paramedics to travel to patients in their homes and provide health services. A funding model that could incentivize states and communities to invest in psychological capital could significantly enhance the well-being of community residents. Health policy can also be used to incentivize providers to pivot towards the

inclusion of mental health care in addition to standard health care services. Additionally, policies should support family-based interventions that are coordinated across sectors as well as integrated health information systems for defined populations experiencing adversity.

CONCLUSION

The study was a necessary first step to understanding the relationships between adversity, psychological capital, social connectedness and resilience. The analysis showed that adversity is associated with social connectedness, psychological capital and resilience in the population of youth experiencing homelessness. Findings did not support a single pathway toward resilience in this population, but that is consistent with complexity. The analysis did point to the significance that psychological capital plays in resilience and the fact that this cannot be ignored in practice or in analysis. Future studies with this population should work to untangle the effects of different categories of adversity on resilience and to understand how those effects change over time. Likewise, the effects of social connectedness and psychological capital are also tangled and change over time. My goal as a nurse scientist will be to better articulate my understanding of this complex system and to integrate different ways of understanding the system. I will also work to learn more advanced methods that have the potential to untangle some of the relationships. Thus, I will continue to work to develop a model of the process of resilience in order to make it more salient for nursing practice and healthcare in general.

Appendix A

Email exchange with UT IRB

Gmail Amelia Manning <ameliadmanning@gmail.com>

Manning IRB Question

3 messages

Amelia Manning <ameliadmanning@gmail.com> Tue, Dec 15, 2020 at 1:45 PM
To: irb@austin.utexas.edu

Hello!
I have a question about expedited vs. exempt status. I've been reading, but I can't quite discern which is most appropriate.

I'm a doctoral student working with Dr. Lynn Rew .
She had IRB approval for the protocol: 2015-07-0009 An Intervention to Promote Health Behaviors in Homeless Youths.
For my dissertation I'm planning a secondary analysis (linear regression mediator analysis) of her de-identified data.

Which status is this and what do I need to complete?

Many thanks!
Amelia

--
Amelia Manning, MSN, RN, Doctoral Candidate
The University of Texas at Austin School of Nursing

IRB <irb@austin.utexas.edu> Tue, Dec 15, 2020 at 1:51 PM
To: Amelia Manning <ameliadmanning@gmail.com>

Hi Amelia,

Thank you for reaching out! Since the data was collected through UT IRB-approved methods, is de-identified, and this would only be an analysis of the data, this does not qualify as Human Subjects Research and therefore would not need IRB approval.

~Ryan Watkins

_____
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Beginning September 23, 2020, UT principal investigators may apply to resume certain types of human subjects research that have been paused due to the COVID-19 pandemic. For information regarding research restart, see the Human Subjects Research Restart website.

Appendix B

Psychometric Properties for Variables in Analysis

vars	n	mean	sd	median	min	max	range	skew	kurtosis	se
UniqueID	283	141.39	81.43	141	1	282	281	0.00	-1.21	4.84
gender_f	281	1.64	0.56	2	1	3	2	0.14	-0.77	0.03
duration_mo	272	42.75	43.04	32.5	0	232	232	1.77	4.21	2.61
age	280	21.08	1.87	21	18	24	6	-0.11	-1.25	0.11
straight_f	278	1.69	0.46	2	1	2	1	-0.80	-1.36	0.03
RacEth_f	281	4.80	0.98	5	1	6	5	-1.40	1.94	0.06
sexAbuse_n	278	0.46	0.50	0	0	1	1	0.16	-1.98	0.03
parentAbuse_n	279	0.29	0.45	0	0	1	1	0.92	-1.16	0.03
parentNeglect_n	281	0.32	0.47	0	0	1	1	0.77	-1.42	0.03
parentDied_n	279	0.11	0.31	0	0	1	1	2.52	4.37	0.02
livArrang_f	280	4.25	1.75	4	1	7	6	-0.02	-0.72	0.10
gradHS_n	281	0.54	0.50	1	0	1	1	-0.18	-1.98	0.03
enrolHS_Coll_n	278	0.12	0.32	0	0	1	1	2.40	3.77	0.02
enrolTech_Voc_n	278	0.02	0.15	0	0	1	1	6.55	41.04	0.01
sc	283	19.88	6.42	19	7	35	28	0.29	-0.68	0.38
res	283	142.84	18.62	146	75	173	98	-0.87	0.65	1.11
hope	283	37.27	7.95	39	6	48	42	-0.85	0.56	0.47
optimism	283	21.54	8.48	21	0	46	46	0.27	-0.12	0.50
ftp	283	23.09	6.36	25	0	28	28	-1.63	2.18	0.38
adversFive	283	42.25	43.18	31	0	232	232	1.77	4.23	2.57
adversFour	283	1.16	1.12	1	0	4	4	0.66	-0.58	0.07
life	283	18.61	7.97	19	5	35	30	0.05	-0.96	0.47
gender	281	1.64	0.56	2	1	3	2	0.14	-0.77	0.03
straight	278	1.69	0.46	2	1	2	1	-0.80	-1.36	0.03
RacEth	281	4.80	0.98	5	1	6	5	-1.40	1.94	0.06
sexAbuse	278	1.46	0.50	1	1	2	1	0.16	-1.98	0.03
parentAbuse	279	1.29	0.45	1	1	2	1	0.92	-1.16	0.03
parentNeglect	281	1.32	0.47	1	1	2	1	0.77	-1.42	0.03
parentDied	279	1.11	0.31	1	1	2	1	2.52	4.37	0.02
livArrang	280	4.25	1.75	4	1	7	6	-0.02	-0.72	0.10

Appendix C

Dissertation Code

Amelia Manning

3/25/2021

```
getwd()
```

```
## [1] "/Users/ameliamanning/Dropbox/2020 Dissertation/R work"
```

load libraries

Import data

Model 1 with Covariates and Social Connectedness

```
summ(Model_1)
```

```
## MODEL INFO:
## Observations: 244 (25 missing obs. deleted)
## Dependent Variable: res
## Type: OLS linear regression
##
## MODEL FIT:
## F(23,220) = 2.32, p = 0.00
## R² = 0.20
## Adj. R² = 0.11
##
## Standard errors: OLS
## ------------------------------------------------------------------
##                                   Est.    S.E.   t val.      p
## ------------------------------ -------- ------- -------- ------
## (Intercept)                     125.79   21.73     5.79   0.00
## gender_fMale                      2.42    2.61     0.93   0.35
## age                               0.98    0.63     1.54   0.12
## straight_fStraight                1.89    2.74     0.69   0.49
## RacEth_fAsian                     9.72   19.23     0.51   0.61
## RacEth_fBlack                   -14.55   18.17    -0.80   0.42
```

```
## RacEth_fLatino/a                  -0.89   19.00    -0.05   0.96
## RacEth_fLatino/Hispanic           -7.70   17.96    -0.43   0.67
## RacEth_fWhite                     -7.68   18.00    -0.43   0.67
## duration_mo                       -0.02    0.03    -0.72   0.47
## sexAbuse_n                        -3.12    2.69    -1.16   0.25
## parentAbuse_n                     -0.93    2.96    -0.31   0.75
## parentNeglect_n                   -4.59    2.80    -1.64   0.10
## parentDied_n                       4.40    3.71     1.19   0.24
## livArrang_fIn jail, youth         -3.79    6.38    -0.60   0.55
## detention, or long term
## residential housing
## livArrang_fOn the                 -8.47    4.65    -1.82   0.07
## street/outdoors
## livArrang_fOther                  -7.97    4.86    -1.64   0.10
## livArrang_fWith adult             -6.05    4.43    -1.37   0.17
## friends in their house or
## apartment
## livArrang_fWith foster            -9.87    9.36    -1.05   0.29
## parents in their house or
## apartment
## livArrang_fWith parents or       -10.08    4.75    -2.12   0.03
## relatives in their house or
## apartment
## gradHS_n                          -1.16    2.31    -0.50   0.62
## enrolHS_Coll_n                     5.16    3.61     1.43   0.15
## enrolTech_Voc_n                    9.84    8.83     1.11   0.27
## sc                                 0.61    0.18     3.32   0.00
## ------------------------------------------------------------
```

Model 2 Covariates, Social Connectedness, Hope, Optimism and FTP

```
summ(Model_2)
## MODEL INFO:
```

```
## Observations: 244 (25 missing obs. deleted)
## Dependent Variable: res
## Type: OLS linear regression
##
## MODEL FIT:
## F(26,217) = 10.25, p = 0.00
## R² = 0.55
## Adj. R² = 0.50
##
## Standard errors: OLS
## -------------------------------------------------------------------
##                                  Est.    S.E.   t val.      p
## ------------------------------ ------- ------- -------- ------
## (Intercept)                     82.22   16.86     4.88   0.00
## gender_fMale                     0.85    2.00     0.43   0.67
## age                              0.24    0.48     0.49   0.62
## straight_fStraight              -0.20    2.06    -0.10   0.92
## RacEth_fAsian                   13.75   14.48     0.95   0.34
## RacEth_fBlack                   -4.28   13.69    -0.31   0.75
## RacEth_fLatino/a                 5.02   14.38     0.35   0.73
## RacEth_fLatino/Hispanic          3.07   13.54     0.23   0.82
## RacEth_fWhite                    3.24   13.57     0.24   0.81
## duration_mo                     -0.01    0.02    -0.31   0.76
## sexAbuse_n                      -1.85    2.03    -0.91   0.36
## parentAbuse_n                    0.17    2.23     0.08   0.94
## parentNeglect_n                 -2.82    2.11    -1.33   0.18
## parentDied_n                     5.94    2.81     2.11   0.04
## livArrang_fIn jail, youth       -7.22    4.83    -1.49   0.14
## detention, or long term
## residential housing
## livArrang_fOn the               -6.18    3.54    -1.75   0.08
## street/outdoors
```

```
## livArrang_fOther                -2.96    3.71    -0.80   0.43
## livArrang_fWith adult           -2.75    3.36    -0.82   0.41
## friends in their house or
## apartment
## livArrang_fWith foster          -3.39    7.05    -0.48   0.63
## parents in their house or
## apartment
## livArrang_fWith parents or      -7.81    3.63    -2.15   0.03
## relatives in their house or
## apartment
## gradHS_n                        -0.44    1.74    -0.25   0.80
## enrolHS_Coll_n                  -1.82    2.77    -0.66   0.51
## enrolTech_Voc_n                  4.23    6.66     0.64   0.53
## hope                             0.89    0.13     6.75   0.00
## optimism                         0.41    0.12     3.40   0.00
## ftp                              0.89    0.16     5.59   0.00
## sc                              -0.18    0.15    -1.17   0.24
## ----------------------------------------------------------------
```

```
export_summs(Model_1, Model_2, scale = TRUE)
summ(Model_3)
```

```
## MODEL INFO:
## Observations: 262 (7 missing obs. deleted)
## Dependent Variable: res
## Type: OLS linear regression
##
## MODEL FIT:
## F(8,253) = 30.92, p = 0.00
## R² = 0.49
## Adj. R² = 0.48
##
## Standard errors: OLS
## -------------------------------------------------
```

```
##                          Est.   S.E.   t val.      p
## -------------------- ------- ------ -------- ------
## (Intercept)             85.52   4.69    18.24   0.00
## sexAbuse_n              -3.65   1.72    -2.12   0.04
## parentAbuse_n            0.85   2.10     0.40   0.69
## parentNeglect_n         -1.35   1.98    -0.68   0.50
## parentDied_n             5.12   2.59     1.98   0.05
## hope                     0.91   0.12     7.39   0.00
## optimism                 0.35   0.11     3.27   0.00
## ftp                      0.83   0.15     5.49   0.00
## sc                      -0.10   0.14    -0.67   0.50
## ---------------------------------------------------
```

Mediation Analysis Series 1

```
# Series one
summary(med.out1)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                Estimate 95% CI Lower 95% CI Upper p-value
## ACME             0.4746      -0.1916         1.52    0.19
## ADE              0.0901      -3.9972         4.37    0.97
## Total Effect     0.5647      -3.4978         4.73    0.80
## Prop. Mediated   0.8404      -3.1285         2.96    0.85
##
## Sample Size Used: 252
##
##
## Simulations: 1000
```

```
summary(med.out3)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                Estimate 95% CI Lower 95% CI Upper p-value
## ACME           -0.01156     -0.44479         0.38   0.918
## ADE            -2.99131     -6.49438         0.48   0.082 .
## Total Effect   -3.00287     -6.51942         0.40   0.090 .
## Prop. Mediated  0.00385     -0.22689         0.26   0.892
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 252
##
##
## Simulations: 1000
```

```
####
summary(med.out4)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                Estimate 95% CI Lower 95% CI Upper p-value
## ACME              0.222       -0.188         0.84    0.29
## ADE              -1.795       -5.755         1.81    0.39
## Total Effect     -1.574       -5.594         2.00    0.46
## Prop. Mediated   -0.141       -1.195         1.40    0.66
##
```

```
## Sample Size Used: 252
##
##
## Simulations: 1000
```

```
summary(med.out6)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME             -0.0332      -0.0970         0.01    0.17
## ADE               0.9206       0.6324         1.23  <2e-16 ***
## Total Effect      0.8874       0.5980         1.20  <2e-16 ***
## Prop. Mediated   -0.0374      -0.1211         0.01    0.17
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 252
##
##
## Simulations: 1000
```

```
####
summary(med.out7)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME              -0.042       -0.108         0.02    0.17
```

```
## ADE               0.414        0.193         0.64  <2e-16 ***
## Total Effect      0.372        0.174         0.58  <2e-16 ***
## Prop. Mediated   -0.113       -0.360         0.05    0.17
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 252
##
##
## Simulations: 1000
```

Series 2

```
####
summary(med.out8)
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                Estimate 95% CI Lower 95% CI Upper p-value
## ACME            -0.0130      -0.0721         0.04    0.67
## ADE              0.9754       0.6892         1.28  <2e-16 ***
## Total Effect     0.9624       0.6672         1.27  <2e-16 ***
## Prop. Mediated  -0.0135      -0.0875         0.05    0.67
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 269
##
##
## Simulations: 1000
#### :)
```

```
summary(med.out9)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME              0.1329       0.0395         0.25   0.004 **
## ADE               0.3179       0.0882         0.56   0.004 **
## Total Effect      0.4508       0.1939         0.71  <2e-16 ***
## Prop. Mediated    0.2947       0.1026         0.60   0.004 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 269
##
##
## Simulations: 1000
```

```
####
summary(med.out10)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME              0.2379       0.1076         0.38  <2e-16 ***
## ADE              -0.0693      -0.3583         0.23    0.63
## Total Effect      0.1686      -0.1241         0.47    0.29
## Prop. Mediated    1.4113      -9.9175        14.97    0.29
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 269
##
##
## Simulations: 1000
```

```
####
summary(med.out11)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                Estimate 95% CI Lower 95% CI Upper p-value
## ACME             0.0551       0.0109         0.12   0.004 **
## ADE              0.9754       0.6771         1.29  <2e-16 ***
## Total Effect     1.0305       0.7355         1.35  <2e-16 ***
## Prop. Mediated   0.0535       0.0106         0.12   0.004 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 269
##
##
## Simulations: 1000
```

```
#### :)
summary(med.out12)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
```

```
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME              0.1050       0.0341         0.21   0.002 **
## ADE               0.8418       0.4888         1.18  <2e-16 ***
## Total Effect      0.9468       0.6032         1.27  <2e-16 ***
## Prop. Mediated    0.1109       0.0337         0.26   0.002 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 269
##
##
## Simulations: 1000
```

```
####
summary(med.out13)
```

```
##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Met
hod
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME              0.2564       0.1208         0.40  <2e-16 ***
## ADE               0.9754       0.7108         1.26  <2e-16 ***
## Total Effect      1.2318       0.9686         1.48  <2e-16 ***
## Prop. Mediated    0.2082       0.0961         0.33  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 269
##
##
```

```
## Simulations: 1000
```

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