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Learning About Systemic Resilience From Studies of Student Resilience

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Introduction

Significant stressors, such as family or school dysfunction, poor physical and mental health, sociopolitical conflict, disasters, and structural disadvantage, have the potential to jeopardize human development and learning. Moreover, these stressors are pervasive (Masten, 2018). Even so, many students whose learning and development are challenged engage in education (Kabiru, Beguy, Ndugwa, Zulu, & Jessor, 2012; Theron & Van Rensburg, 2018), demonstrate academic buoyancy and/or academic achievement (Martin & Marsh, 2008; Motti-Stefanidi, 2015; Obradović et al., 2009), and/or attain or sustain mental health (Dray et al., 2017; Sharp, Penner, Marais, & Skinner, 2019).

To explain and facilitate the previously mentioned positive outcomes, studies of student resilience have proliferated (see Table 13.1). Following Ungar (2011) and other similarly prominent social scientists' emphasis on a social ecology's (e.g., a school ecology) shared responsibility for youth resilience, accounts of student resilience do not hold vulnerable students solely responsible for positive learning and developmental outcomes. Instead, student resilience is defined as a dynamic interaction between a student and a school ecology that facilitates her or his positive adaptation to current and historic stressors that have, or previously had, the potential to obstruct learning and/or development (Theron & Donald, 2013; Toland & Carrigan, 2011).

A school ecology comprises multiple systems that are primarily relational and organizational (Waters, Cross, & Shaw, 2010). The relational systems include a school's major role players—its students, staff, and parents—and the interactions between these role players.

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TABLE 13.1 Microsystemic Competencies/Processes/Resources Associated With Resilient Learning and Development

Microsystem	Competencies/Processes/ Resources	Sample Sources
Student	Agency, autonomy	Berridge (2017), Deakin Crick et al. (2015), Doll (2013), Truebridge (2014)
	Cognitive capacity	Cinkara (2017), Malekan and Hajimohammadi (2017), Willner et al. (2015)
	Self-regulation	Ainscough et al. (2018), Fried and Chapman (2012), Kim et al. (2018), Portilla et al. (2014)
	Social/emotional competencies	Alessandri et al. (2017), Bailey and Baines (2012), Khambati et al. (2018), Truebridge (2014), Wilson (2016)
	Engagement in school	Irvin (2012), Khambati et al. (2018), Jones and Lafreniere (2014), Motti-Stefanidi and Masten (2013), Venta et al. (2018)
Educational institution	Whole school level	
	Compliance with enabling district/national policy	Cornell and Limber (2015), Crawford and Burns (2015), Freeman and Simonsen (2015), Snelling et al. (2017)
	Community-congruent, positive values	Cohen (2013), Reyes et al. (2013)
	Competent leadership	Day and Gu (2013), Sardar and Galdames (2018)
	Curricula; prevention and/or intervention programs	Corcoran et al. (2018), Dray et al. (2017), Fenwick-Smith et al. (2018), Henderson (2012), Hodder et al. (2017), Mirzah and Arif (2018), Obradović et al. (2009), Siu (2009)
	Green school yards/ opportunities to play	Chawla et al. (2014), Doll and Brehm (2010)
	Infrastructure/furniture that support the physical safety of students/staff; safe schools	Cluver et al. (2019), Hewitt et al. (2001), Sheffield et al. (2017), Shiwaku et al. (2016), Sweet and Tucker (2018)
	Positive organizational climate	Aldridge et al. (2016), Cohen (2013), Henderson (2012), Mampane and Bouwer (2011), Peguero et al. (2019), Yablon (2015)
	Relevant school-based services	Höjer and Johansson (2013 Kumpulainen et al. (2016), Masten (2014)
	School family connections/ partnerships	Esquivel et al. (2011), Nichols et al. (2016), Motti-Stefanidi (2015), Shute et al. (2011), Tzuriel and Shomron (2018)
	Supportive and/or prosocial peers	Delgado et al. (2016), Espinoza et al. (2014), Furrer et al. (2014), Im et al. (2016), Maunder and Monks (2018), Oldfield et al. (2018), Sapouna and Wolke (2013), Tatlow-Golden et al. (2016), Wentzel et al. (2004)
	Classroom level	
	Resilient teachers	Beltman (Mansfield (and Price (2011), Papatraianou et al. (2018), Soulen and Wine (2018), Wosnitza et al. (2018)
	Warm, respectful classroom relationships [including teacher↔student and student↔peer relationships]	Cefai (2007), Doll (2013), Doll et al. (2014), Hall and Theron (2016), Harðardóttir et al. (2015), Nolan et al. (2014), Papatraianou et al. (2018), Roorda et al. (2011), Sharkey et al. (2008), Theron and Theron (2014), Trieu and Jayakody (2018), Venta et al. (2018)
	Adaptive teaching and/or assessment approaches	Hadas-Lidor and Weiss (2014), Harðardóttir et al. (2015), Howell et al. (2018), Tull et al. (2017)

The organizational systems, meanwhile, comprise structural (e.g., the size of a school or the sector it represents), functional (e.g., policies and procedures), and built (e.g., a school's buildings or recreational facilities) dimensions. Waters et al. (2010) expressed concern that studies of positive student outcomes (e.g., school connectedness) have marginalized the role of organizational impacts (particularly the built environment). However, organizational systems (including the built school environment) are surfacing in studies relating to school capacity for disaster resilience (e.g., Shiwaku, Ueda, Oikawa, & Shaw, 2016).

As presaged by Bronfenbrenner (1979), students, their families, and the human and organizational systems associated with a school ecology are themselves nested in a wider ecology. For instance, school implementation of enabling policies (e.g., policies that support healthy nutrition or physical safety) implies that the school is embedded in a macrosystem (such as a school district or state) that is sensitive to its duty to support young citizens' well-being and has the necessary capitals to support policy compliance (Snelling et al., 2017). In other words, as illustrated in Figure 13.1, student resilience needs to be understood in systemic context that includes micro- and macrolevel influences (Theron & Donald, 2013). From this systemic perspective, student resilience is intertwined with proximal and distal human and organizational systems that are interdependently and iteratively facilitative of positive student outcomes (Roffey, 2016).

In this chapter I draw on studies of student resilience, and their attention to the multiple and co-occurring systems that facilitate a student's positive adaptation to significant stressors, to distill a set of propositions that promotes a multisystemic conceptualization of human resilience. To arrive at these propositions, I first reflect on resilience-enabling transactions between students and school ecologies and argue that these transactions are (a) complex, (b) scaffolded by resilient school ecologies, and (c) imply trade-offs at the expense of teacher well-being. I conclude the chapter by considering the value of the three propositions for future investigations and applications of resilience in educational settings.

Resilience-Enabling Transactions Between Students and School Ecologies Are Complex

Inter- and cross-disciplinary inquiry has supported a comprehensive understanding of how students and their school ecologies contribute to the process of successful learning and development under stress (Alexander, 2018; Noltemeyer & Bush, 2013). Essentially, each facilitates successful learning and development via various adaptive capacities, processes, or supports (see Table 13.1). For instance, much attention has been paid to students' capacity to regulate their emotion, behavior, and cognition and how this capacity shapes positive learning and developmental outcomes, particularly in the face of threats to their learning and development (Masten, 2014; Masten & Wright, 2010). Similarly, much attention has also been paid to teacher capacity to champion the resilience of vulnerable children and youth (Ungar, Russell, & Connelly, 2014). Teachers' capacity to work supportively with students and their families, communicate realistic expectations, inspire agency and mastery, and teach competently are associated with students' successful learning and development (Theron, 2016a). Even though

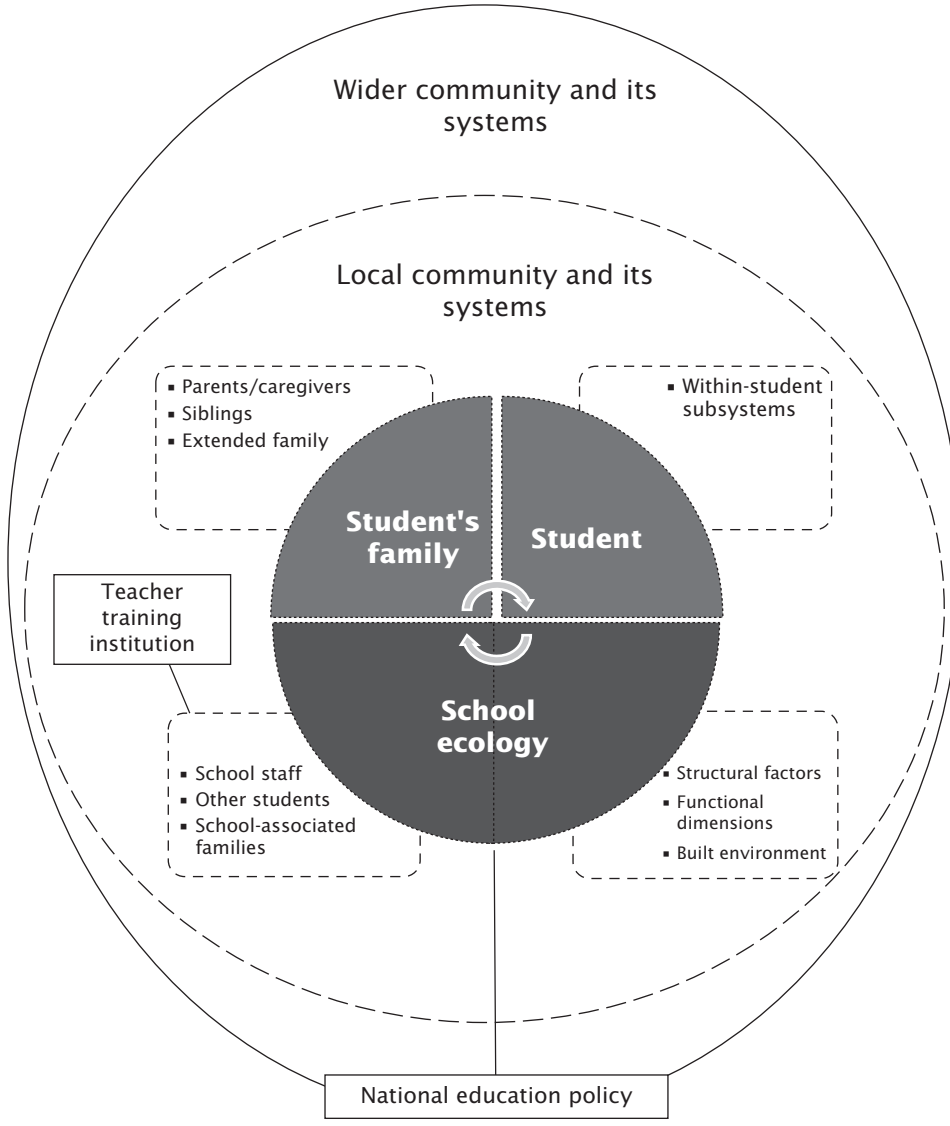

FIGURE 13.1 The multiple systems implicated in vulnerable young people's learning and development. Adapted from Donald et al. (2010) and Masten (2014).

these capacities often come at a cost to teachers themselves (e.g., teacher burnout; Fleming, Mackrain, & LeBuffe, 2013), they are considered pivotal to student resilience.

In interaction, however, adaptive capacities, processes, or supports are strengthened or weakened (e.g., Baker, 2006; Mitchell, 2017; Portilla, Ballard, Adler, Boyce, & Obradović, 2014; Rimm-Kaufman, Baroody, Larsen, Curby, & Abry, 2015; Rudasill & Rimm-Kaufman, 2009; Vanlaar et al., 2016). Studies on self-regulation offer a meaningful illustration of the aforementioned. Better executive functioning and associated self-regulation skills (traditionally considered a within-person subsystem) advance students' capacity to learn effectively. As

explained by Blair and Diamond (2008), students' capacity to better self-regulate is partially informed by their genetic make-up. In particular, the COMT gene (which plays a role in clearing away dopamine) influences the neural functioning of the prefrontal cortex (the area of the brain that impacts executive function and the capacity to regulate attention). Because higher levels of dopamine are associated with advanced executive functioning, the Met/Met *COMT* genotype (which reduces dopamine more slowly) is associated with better executive functioning than the Val/Val *COMT* genotype (which reduces dopamine more quickly). However, dopamine is also stress-sensitive and so a student's genetic capacity provides an incomplete explanation of why learning could be more, or less, successful. A more complete explanation would factor in the interaction between the student and school ecology (or other relevant social systems; Blair & Diamond, 2008). For example, in stressed classrooms (e.g., classrooms characterized by negative teacher–student or student–peer interactions) students with the Met/Met *COMT* genotype would likely show poorer executive functioning. Conversely, the progress of students with the Val/Val *COMT* genotype is less likely to be affected by exposure to classroom-related stress.

Failure to recognize that students' capacities for self-regulation depend on more than personal factors can have dire consequences for academic resilience. This is illustrated by Portilla et al.'s (2014) study of 338 American five-year-olds. These researchers showed that the children's transactional relationships with teachers shaped how these children's academic competence developed over time. Children who evidenced less positive behavior (i.e., low self-regulation) experienced associated decreases in the quality of teacher–child relationships during kindergarten and concomitant decreases in school engagement. They also evidenced subsequent poorer academic progress in first grade. These results fit with understandings that young people who demonstrate poorer capacity to self-regulate typically elicit negative responses from their families, school staff, and peers and that this negative interaction decreases children's potential for successful learning and adaptation (Blair & Diamond, 2008). Still, there are studies that demonstrate that poorly regulated children can have positive relationships with their teachers (Baker, 2006; Myers & Pianta, 2008). As explained by Sabol and Pianta (2012), although teacher–student relationships are "a product of individual teacher and child characteristics, which reciprocally influence one another" (p. 214), thoughtful teacher responses can revise the student's internal working model of relationships and support a teacher–student bond. This implies that for students to learn and develop well, the capacity of teachers (and other adults) to regulate their responses to students who are poorly self-regulated is at least as important as students' capacity to self-regulate. The same applies to the other microsystems (e.g., families or peers) implicated in successful learning and development.

Despite growing understandings that adult capacity to self-regulate intersects with students' regulatory capacities, interventions to support self-regulation are typically aimed at students; parents, teachers, and others with whom students might interact regularly are routinely excluded (Haslam, Mejia, Thomson, & Betancourt, 2019). Moreover, as Haslam and colleagues (2019) showed in their empirical work documenting the benefits of self-regulation to resilience and how best to advance this skill, most of this research has been conducted in high-income countries that value individualism. This has fueled concerns about whether

self-regulation manifests similarly or differently in low- and middle-income countries where interdependence is valued and self-regulation is often a function of the collective. These concerns illustrate the complexity of truly understanding, and facilitating, resilience-enabling student↔school transactions across contexts.

Further, how school ecologies transact with students to support resilience can be influenced by schools'/students' interactions with other important microsystems (e.g., the at-risk student's family). For instance, teacher interactions with parents, and vice versa, are associated with vulnerable young people's constructive engagement in education (Doll, 2013). A case in point is a phenomenological study of the resilience of 16 South African university students from structurally disadvantaged contexts (Theron & Theron, 2014). During high school, their academic success was frequently threatened by a lack of basic resources that complicated payment of mandatory school fees, punctuality, and/or regular school attendance. Once the students' family had communicated the reasons for these complications to school staff, the staff were supportive and found creative ways to accommodate these young people in the school system. The students reported that teachers' positive responses to family-mediated information fueled their determination to succeed academically. Importantly, Theron and Theron (2014) drew attention to the role of teacher approachability in family disclosures about hardship and linked such openness to teachers' understanding of the socioeconomic and historical context of the schools they worked in and how this impacted local families and students. Many South African parents, particularly those from disadvantaged communities, avoid interacting with their children's school. This relates to South Africa's historic political inequities and ongoing structural inequality that have translated into significant numbers of poorly educated or illiterate parents and concomitant parental reticence to be involved in children's schooling. In addition to teachers acting on this knowledge, some South African schools have chosen to purposefully educate parents about the value of family involvement in children's education and to implement interventions to support parent involvement (Okeke, 2014). Implicit in the results of studies such as that by Okeke (2014) is that one system implicated in young people's successful learning and development may need to prompt and enable another implicated system to facilitate young people's resilience. Put differently, even though systemic support of student resilience is usually reactive, it is possible to proactively scaffold student resilience (Theron, 2016a).

Such proactivity would be helpful at the macro level, particularly given how a social ecology's functioning, norms, and values shape student resilience (Phasha, 2010). This is well illustrated in a South African study with 503 adolescents from disadvantaged and violent communities (Herrero Romero, Hall, Cluver, Meinck, & Hinde, 2018). This study showed that exposure to multiple types of violence heightened the chances that young people's academic progress would be delayed (e.g., via grade failure or disrupted schooling). Ironically, even though their academic progress was obstructed, the adolescent participants from the Herrero Romero et al. (2018) study continued to report academic aspirations. In and of themselves, these aspirations are not significant, given that disadvantaged but high-functioning South African youth regularly report a desire to complete secondary schooling and obtain a tertiary qualification (Dass-Brailsford, 2005; Phasha, 2010; Theron, 2016b). What is significant, however, is Herrero Romero et al.'s conclusion that macrosystemic influences (i.e., living in a

community characterized by high rates of violence) have the power to impact young people's capacity to realize academic aspirations. Put differently, a dysfunctional macrosystem has the power to compromise resilience-enabling school ecology↔student transactions.

Finally, the protective effects of student↔school transactions may not endure over time or apply equally to all students. This compounds the complex nature of resilience-enabling transactions between students and school ecologies. A case in point is the longitudinal study of the resilience of 269 school-attending African American adolescents exposed to violence (DiClemente et al., 2018). This study showed that school cohesion facilitated students' self-esteem and ethnic identity when the students were in Grade 7. Thereafter (i.e., in Grade 8 and subsequently) school cohesion did not yield similar protective effects. Moreover, the protective effects only applied to boys. Sex/gender and age differences are not the only reasons for differential protective effects. As theorized by Ungar (2018b), the level of risk that students are exposed to can translate into protective student↔school transactions being differentially impactful. In this regard, a longitudinal study of 571 classes across six European countries showed that teacher practices and school factors (e.g., accessible resources) were differentially supportive of student achievement in mathematics and science (Vanlaar et al., 2016). Low-achieving students benefitted more than high-achieving students from teacher practices, thereby pointing to the importance of placing the most competent teachers in schools with the greatest numbers of low-achieving students.

In summary, this section has illustrated that interactions between students and their school ecologies are multifaceted and account for the strengthening or weakening of the adaptive capacities, processes, and supports that scaffold student resilience. Other co-occurring systems—specifically the quality of their functioning and, in the case of co-occurring human systems, their willingness to co-facilitate student resilience in contextually appropriate ways—ratchet up the complexity of resilience-enabling student↔school ecology transactions. Dysfunctional co-occurring systems do more than jeopardize resilience-enabling student↔school ecology transactions; they jeopardize the functioning of school ecologies too. For this reason there is increasing attention to the resilience of school ecologies.

Resilient School Ecologies Scaffold Resilience-Enabling School-Student Transactions

As alluded to in the aforementioned study by Herrero Romero et al. (2018), vulnerable students often attend schools in disadvantaged and/or violent communities. There is a risk that the odds that characterize these communities will seep into the schools and jeopardize school functioning and/or that high numbers of high-risk students will compromise school effectiveness (Day & Gu, 2013). Schools that function well despite such systemic risks to their functioning have become known as resilient schools (Day & Gu, 2013; Hewitt, Epstein, Leonard, Mauthner, & Watkins, 2001; Masten, 2014; Pinskaya et al., 2018). School resilience is typically deduced from indicators of organizational efficacy, such as student pass rates, reputation for academic excellence, or capacity to control within-organization violence. For

instance, in her study of the education-facilitated resilience of vulnerable girls from an all-girls school in Sierra Leone, Sharkey (2008) described a school system that appeared to not only tolerate the pervasive violence against girls that characterized the wider Sierra Leone ecology at that time, but also enact violence against girls. Girls were harassed in the streets surrounding the school, but the school apparently did nothing to prevent this. Within the school, physical and verbal violence seemed to be normalized (i.e., staff routinely humiliated and beat the girls). In short, the school system failed to protect its students or to optimize their development. In contrast, Naicker et al. (2016) described a no-fee, poorly resourced school (Wembibona) located in a disadvantaged South African neighborhood characterized by risks that routinely undermine a school's capacity to function well. Despite these risks, Wembibona outperformed schools facing similar threats. It kept its members safe with the help of a full-time security guard. Staff and students were known for their motivation to achieve and their curricular and extracurricular success. In short, its capacity to resist the neighborhood risks contagion led to Wembibona being described as a school "performing against the odds" (Naicker, Grant, & Pillay, 2016, p. 1).

Although resilient schools hold benefits for staff and the local community (Day & Gu, 2013), benefits to students are more typically reported. For instance, a large-scale American study showed that students who are at greater risk for school attrition (i.e., ethnically or racially marginalized students from disadvantaged families or communities) are less likely to disengage from schooling if their school functions well and if they perceive it to be well-functioning (Peguero, Merrin, Hong, & Johnson, 2019). One implication of these findings is that resilient schools are perhaps even more important to the developmental outcomes of ethnically and racially marginalized students than students made vulnerable by nonstructural risks.

Increasingly, school resilience also denotes the capacity of a school to protect staff and students from physical harm. For instance, awareness of the harmful effects of specific pollutants (e.g., lead) has meant that the construction and upkeep of schools purposefully avoids student and staff exposure to pollutants (e.g., preferences for lead-free paint; Sheffield, Uijttewaal, Stewart, & Galvez, 2017). Also, in the face of the growing incidence of disasters, resilient schools are those schools that are designed, or adapted, to withstand disaster (Gedey et al., 2018). To this end, primary schools in New Zealand have investigated how best to adapt school furniture (e.g., school desks) to offer protection to students and staff in the face of earthquakes (Sweet & Tucker, 2018). Elsewhere, earlier understandings of how green schoolyards enabled student resilience (Chawla, Keena, Pevec, & Stanley, 2014) have been expanded to include their potential protection against localized flooding (Gedey et al., 2018).

Japanese researchers have drawn attention to the multiple systems, at both the micro- and macrolevel, implicated in the capacity of schools to be disaster resilient. For example, Shiwaku and colleagues (2016) surveyed the resilience of schools in Kesennuma (a city that was devastated by the 2011 East Japan Earthquake and Tsunami). They measured the schools' physical conditions (i.e., buildings, facilities, and equipment, environmental conditions), human resources (i.e., teachers, students, parents), institutional resources (i.e., management, budget, disaster planning), external relationships (i.e., collaboration with local government

and board of education, relationship to local community, mobilizing funds from local, government, and other stakeholders), and natural conditions (i.e., severity and frequency of natural disasters and the natural environment surrounding the school). Although the aforementioned were all important to the schools' capacity for disaster resilience, study results urged improved relationships between schools and systems external to a school. Such results draw attention to the important role that macrosystems (such as communities and governments) can play in a school's disaster resilience, particularly when the natural ecology (also a macrosystem) of the school is characterized by higher potential for natural disasters. In this regard, the World Bank's (2018) willingness to fund the construction of earthquake-resistant schools in various seismically active areas in Turkey is both exemplary and far-seeing of the facilitative value of constructive macro/microsystem relationships.

These systemic advances are crucial as disasters that strike schools can be criminal in origin. For instance, students and school staff are frequently the victims of lethal attacks that take place on school premises (e.g., shootings at American schools [Coughlan, 2018], stabbings at South African schools [Grobler, 2018]). While these disasters probably reflect microsystemic pathology and macrosystemic disorder (e.g., lax firearm laws; normalization of violence), they nevertheless signal that school capacity to be disaster resilient should go beyond so-called natural disasters. The impact of criminal disasters is often profound for teachers; their lives are potentially imperiled and in addition they frequently have to support traumatized students. This calls teacher resilience into question.

Resilience-Enabling Transactions Between Students and School Ecologies Imply Trade-Offs at the Expense of Teacher Well-Being

Continuously caring for and about children, particularly children who are disadvantaged or otherwise challenged, fatigues teachers (Day & Hong, 2016; Day & Gu, 2013; Muijs, Harris, Chapman, Stoll, & Russ, 2004). It is, therefore, not surprising that championing student resilience could have costs for teachers' well-being and long-term commitment to the profession (Fleming et al., 2013; Wosnitza et al., 2018). Resilient teachers, however, neither burn out nor quit the profession. Instead, they evidence "positive adaptation and ongoing professional commitment and growth in the face of challenging circumstances" (Beltman & Mansfield, 2018, p. 4). In addition to personal benefits, teacher resilience holds advantages for students (Briner & Dewberry, 2007; Roffey, 2012) and for schools and their immediate communities (Beltman, Mansfield, & Harris, 2016; Wosnitza et al., 2018). Accordingly, some tertiary institutions offer teacher resilience training programs at pre- and in-service levels (Beltman, Mansfield, Wosnitza, Weatherby-Fell, & Broadley, 2018; Jennings, Frank, Snowberg, Coccia, & Greenberg, 2013; Mansfield, Beltman, Broadley, & Weatherby-Fell, 2016; Peixoto et al., 2018). Additionally, schools (particularly resilient schools; see Day & Gu, 2013) can deploy resources to enable and/or sustain teacher well-being (Mathur, Gehrke, & Kim, 2013; Soulen & Wine, 2018). For instance, a study by Beltman et al. (2016) reported that rural Australian teachers'

interaction with support services (such as those provided by educational psychologists or chaplains) facilitated the resilience of teachers challenged by difficult or needy students.

The work by Acevedo and Hernandez-Wolfe (2014) suggests that student resilience can serve as a vicarious pathway of teacher resilience, particularly when the schools in which teachers work demand that teachers care for vulnerable young people. Their study with 21 teachers from Colombia showed that student resilience can inspire teachers toward personal and professional resilience. In witnessing their students' capacity to adjust well, Colombian teachers experienced a reciprocal benefit from their care-demanding work (Hernandez-Wolfe, 2018). Conversely, studies of the resilience of South African adolescents have explicated that teachers who come from the same or similar disadvantaged contexts as their students have inspired resilience in these students (e.g., Dass-Brailsford, 2005; Theron, 2007). Just as the Colombian teachers were enabled by the example of their students, the South African students were enabled by the example of their teachers who had risen above the odds of structural inequality. Taken together these studies suggest that teacher resilience prompts student resilience vicariously, and vice versa.

Despite the apparent value of teacher resilience, and systemic efforts to enable and sustain teacher resilience, Ungar's (2018a) reference to the trade-offs that one system experiences when the resilience of another system (e.g., a student) is prioritized comes to mind. Expectations of teachers to care continuously (e.g., Day & Gu, 2013; Day & Hong, 2016; Gu, 2018) elevate the chances of teachers experiencing emotional exhaustion (Day & Hong, 2016; Hernandez-Wolfe, 2018). In contrast, when teachers are not expected to care, there is apparently no trade-off to teacher well-being, but there is limited evidence of resilience-enabling student↔school ecology transactions (Sharkey, 2008).

Three Propositions

The studies of student resilience that I included in the preceding parts of this chapter support Ungar's (2018a) theorizing that the resilience of a stressed system (such as a student at risk) manifests as a complex adaptive process to which multiple systems and subsystems co-contribute. Via their appreciation of the multiple, co-occurring systems—human *and* organizational—that co-facilitate vulnerable students' positive adaptation to significant stressors, the previously referenced studies discourage mono-systemic or simplistic accounts of human resilience, particularly ones that ignore the role of nonhuman systems. Likewise they signpost that resilience goes beyond psychological resources. To date, most studies of human resilience have emphasized adaptive psychological processes and associated systems (Masten, 2014). Whereas psychological inputs (such as self-regulation) remain important, the student resilience studies compel attention to how various human and nonhuman systems strengthen or weaken psychological inputs. Further, the included studies suggest that it is plausible that co-contributing systems (human and organizational) are themselves resilient, so to speak, and that their co-contribution could involve an immediate or long-term trade-off (i.e., come at a cost to the co-contributing system). In the case of a trade-off, interventions or rewards (even vicarious ones) may be necessary to maintain the resilience of

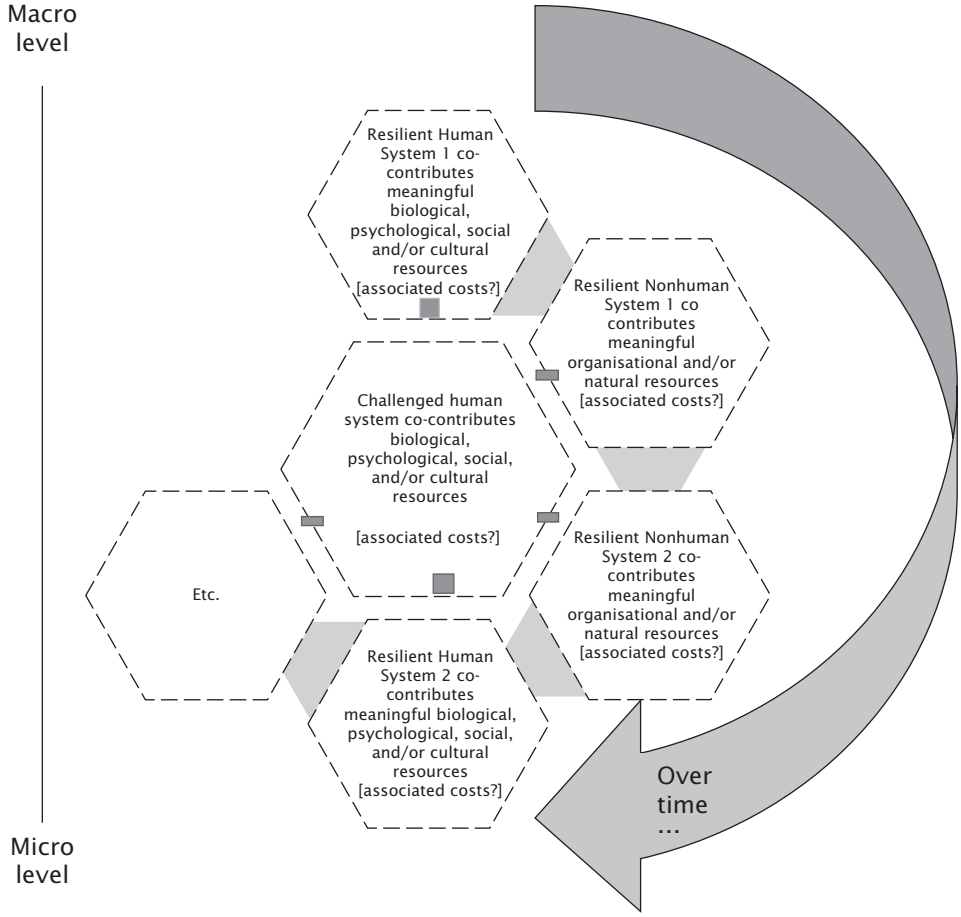

FIGURE 13.2 The multisystemic underpinnings of human resilience at a given point in time and over time.

the co-contributing system. Taken together then, and as illustrated in Figure 13.2, studies of systemic student resilience prompt three propositions:

1. The resilience of a challenged human system (or subsystem) is meaningfully co-facilitated by co-occurring human and nonhuman systems at the micro through to macro level.
   a. Meaningful implies that the co-facilitation is not a random response. Instead, it is purposefully supportive of the adaptive capacity of a vulnerable system in ways that align with that system's particulars (e.g., its biological/chronological characteristics; its contextual, sociocultural, and/or temporal positioning). The response, which can be proactive or reactive, fits the type and severity of the risk that resulted in the human system in question being vulnerable.
   b. Co-facilitation implies that the challenged human system is not a passive recipient of systemic support. Instead, the challenged human system contributes actively to the

process of resilience. Further, co-facilitation implies no sequence. Co-facilitation of resilience could be initiated by the challenged system or the facilitative one.

   c. The co-occurring human and nonhuman systems are not specified as they are likely to vary, depending on risk specifics. For example, in instances where disasters have challenged the learning or development of a student the human and nonhuman systems could include school–community partnerships and the built and natural environment (as in the study by Shiwaku et al., 2016). In comparison, when structural disadvantage and communicable disease challenge the learning or development of students, the human and nonhuman systems may well be supportive parents, safe schools, and welfare (i.e., cash transfers), as in the study by Cluver et al. (2019).

2. The co-occurring, co-facilitative systems are functional (i.e., resilient) systems.
   a. The resilience of co-occurring systems is indicated by their capacity to be functional despite the presence and history of risks that predict impaired system functioning and to champion the resilience of co-occurring challenged systems regardless of the aforementioned risks.
3. There might be a cost to the co-facilitative system or subsystem, but this potential cost can be moderated by the provision of relevant interventions and/or rewards.
   a. Much like the reference to "meaningful" in Proposition 1, relevant implies a purposeful response that is designed to enable and sustain a co-facilitating system's functionality when that functionality is compromised by a system or subsystem championship of the resilience of a challenged system or multiple systems. The moderating response can be proactive or reactive.
   b. Functional co-occurring systems provide the relevant interventions.
   c. The rewards, which could be vicarious, intangible, and/or reciprocal, could be provided by functional co-occurring systems or the challenged system or systems (e.g., as in the case of the Colombian teachers who were enabled by the example of their vulnerable students; Hernandez-Wolfe, 2018).

Implications of the Three Propositions for Resilience Research and Intervention

The three propositions promote a complex systemic understanding of resilience that cautions against a business-as-usual approach to future resilience research or intervention. Forthcoming resilience research will need to be more attentive to the roles of interdependent systems and the complexity of resilience. In particular, advanced understandings of human resilience will require prospective consideration of protective systems and subsystems and systemic interactions that matter most for specific human systems at lower and higher levels of risk (Theron, 2018). Similarly, it will be important to identify what level (or threshold) of adaptation could be used to judge the resilience of a system or the need for resilience-enabling interventions (Sattler & Gershoff, 2019). Further, Masten's (2018) certainty that the resilience of various systems is informed by similar processes encourages scrutiny of the similarities in the resilience of co-occurring systems. For instance, resilient schools are

characterized by an enabling set of beliefs about the school's capacity and vision and by facilitative organizational patterns (Naicker et al., 2016); a resilient family shares a set of enabling beliefs about its capacity to solve problems and is flexible in its organization (Walsh, 2003). Such apparent similarities (and potential differences) should be explored empirically before being assimilated in the support of system resilience.

Understanding that co-occurring human and nonhuman systems co-facilitate human resilience means that future studies of human resilience, including student resilience, will require multidisciplinary research teams and a transdisciplinary appetite to drive these studies. For instance, Sheffield et al. (2017) have contended that schools' capacity to protect and enable students transcends "the instruction, relationships, and other significant experiences that occur in school" to also encompass "building infrastructure, grounds, neighborhood and surroundings" (p. 1). Similarly, Sun and Stewart (2008) have argued that enabling physical and social contexts—also at schools—are key to the promotion of resilience. To draw attention to the complexity of these insights, and to leverage them, requires education scientists and educational psychologists to collaborate with scholars specializing in disaster recovery, architecture and design, ecological systems, and the prevention of violent crime.

Conclusion

Globally, the study of resilience remains relevant (Masten, 2014, 2018). However, if the study of resilience is to generate scalable solutions to the escalating threats to humans and natural ecologies then it must pay systematic, sophisticated attention to the multiple human and other systems that scaffold the resilience of multiple systems at a given point in time and over time. Moreover, attention is needed to how human and nonhuman systems interact in ways that advance or ameliorate risk and to their differential impacts (see Ungar, 2018b). The advent of modern scientific tools (e.g., geospatial mapping and tracking, bio-scanners, DNA sequencers, neurological scans) will do much to facilitate such an advanced study, so long as resilience researchers and their funders suspend studies that fail to define, investigate, and account for resilience systemically. If not, the field will most certainly research itself into irrelevance and the next generation of practitioners and policymakers will fail to make a meaningful difference to the systems they serve, including the very educational systems which must produce the next generation of researchers.

Key Messages

1. The science of resilience—including student resilience—is popular. Nevertheless, simplistic or mono-systemic accounts of resilience are likely to jeopardize the long-term usefulness of resilience science.
2. Student resilience—like other human forms of resilience—is a dynamic process that is grounded in interacting human and non-human systems and associated subsystems.
3. Resilient school ecologies (and associated relational and organizational subsystems) are fundamental to student resilience. Even so, the resilience of other co-occurring systems

(e.g., resilient families, resilient neighborhoods, resilient natural ecologies, resilient governments) also matter for student resilience.

4. There are costs to resilient systems championing the resilience of less resilient systems. These costs can, and should, be moderated.

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