Evolution of a Mixed Methods Research Tool to Depict Children’s Social Ecologies in Their Own Words

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ABSTRACT

This article describes the conceptual foundations and evolution of a mixed methods research (MMR) tool—the ecomap—from an intervention activity to a developmentally, culturally, and contextually adaptable MMR data collection strategy. Guided by ecological-developmental theory (Bronfenbrenner, 1989, 1999), a model of psychological well-being that accounts for individual and cultural factors (Nastasi, Varjas, Sarkar, & Jayasena, 1998), rights-respecting research (Alderson, 2012), and culturally sensitive research (D’Augelli, 2003), our international work with school-age children and youth from 12 countries necessitated the use of a tool that could appropriately engage and capture their perspectives about their social experiences related to stress, support, and coping. In the context of this international study, we modified the intervention tool for data collection purposes and developed procedures for mixed methods analysis. The ecomap consists of a self-generated drawing to depict an individual’s social network, including the type and quality of relationships. The drawing was coded quantitatively to depict size of social network, balance of stress and support within the network, and types of relationships. Descriptions of the relationships and related stories about stressful and supportive experiences were coded qualitatively for culturally valued competencies, stressors, supports, and reactions to stress and support. The mixed methods procedures permitted examination of patterns of stress and support across age, gender, context, and site. In this article, we describe the ecomap protocol and data analysis procedures for its use as an MMR tool, providing illustrations from programmatic research. The article concludes with discussion of limitations and future directions.

KEYWORDS

Child ecologies; culturally sensitive research; ecomap; mixed methods research; rights-respecting research

The impetus for a mixed methods research (MMR) tool was our interest in representing children’s perspectives about stress and support in their social ecologies across developmental level, culture, and context, and our recognition of the limitations of existing tools for conducting international research with school-aged populations (ages 5-18). We were interested in capturing the “potential variations in worldviews and meaning across cultures and languages ... without imposing [construct] definitions” (Nastasi & Borja, 2016a, p. 1) developed primarily with mainstream adult populations from North America and Western Europe (see also, Arnett, 2008; Borja, Nastasi, & Sarkar, 2017; Farrell, Jimerson, & Oakland, 2007). We wanted to engage in rights-respecting research (Alderson, 2012), which ensured meaningful child participation (i.e., representing child voices) consistent with UNICEF (1989) Convention on the Rights of the Child (Nastasi, 2014). We sought techniques that could be applied across the age range of school-based populations, without limiting participation based on cognitive or language ability. Moreover, we wanted a way to represent children’s perspectives and experiences...
both qualitatively and quantitatively in a standardized, efficient manner. In particular, we wanted to represent children’s experiences of stress and support within their social ecology by mixing qualitative and quantitative data derived from a single tool.

To address the concerns detailed in the previous paragraph, we developed mixed methods procedures for analysis of the ecomap, a child-generated graphic representation and accompanying narrative of (a) key relationships in the child’s social ecology and (b) experiences of stress and support in those relationships. From the ecomap drawing, quantitative indices are generated: Social network size refers to the total number of relationships included in the self-generated depiction. Stress-support index (SSI) refers to the balance of stress and support within the network; SSIs can be computed for total network and by type of relationship (e.g., family, peers, teachers/school staff). Qualitative analyses are conducted using the accompanying narrative description of the network, which includes explanation of stress and support (e.g., associated feelings, reason for stress/support) and stories about stress and support experiences in depicted relationships. The narrative data are coded for sources of and reactions to stressors and supports, including reasons for stress/support and associated feelings, thoughts, and behaviors. The combination of quantitative and qualitative data derived from the ecomap drawing and accompanying narratives yields a phenomenological view of the stress and support experiences within an individual’s social network. Collectively, the ecomaps of children and adolescents yield mixed methods data that can be further analyzed for developmental, contextual, and cultural variations.

In this article, we describe the conceptual foundations, and trace the evolution of the ecomap through a multi-year research program, from an intervention activity to a MMR tool. We highlight the application of the ecomap as a qualitative elicitation technique for ethnographic, phenomenological, and participatory action research; a quantitative indicator of student well-being; and a developmentally, culturally, and contextually adaptable mixed methods tool for exploring stress and coping in international research. We conclude with a discussion of limitations and future research directions.

**Conceptual Foundations**

The use of the ecomap as a MMR tool is based on the integration of four foundations: (a) ecological-developmental theory (Bronfenbrenner, 1989, 1999); (b) a model of psychological well-being that accounts for individual and cultural factors; (c) rights-respecting research (Alderson, 2012); and (d) culturally sensitive research (D’Augelli, 2003). In this section, we describe these four foundations and their integration as the basis for the MMR-Ecomap.

**Ecological-Developmental Perspective**

Bronfenbrenner’s (1989, 1999) Ecological Systems Theory (EST) provides an overarching framework to guide our exploration of the influence of culture and context on child well-being and development. Development encompasses all aspects of child well-being, as articulated in the U. N. Convention on the Rights of the Child (CRC; UNICEF, 1989): physical, cognitive, language, social-emotional, and spiritual. However, the specific focus of our research with the ecomap is the psychological (social-emotional, behavioral) well-being of children and adolescents. We focus on school-age populations, typically ages 5 to 18 years. Based on the EST, a child’s ecology is an integrated set of social-cultural systems, all of which have direct or indirect influence on the child (see Figure 1; Nastasi, Moore, & Varjas, 2004). A microsystem is the immediate environment in which the child interacts with peers (e.g., friends, classmates, siblings) and adults (e.g., parents, teachers) and that has a direct influence on development and well-being. Within our work, the microsystem defines context, that is, the immediate setting such as the classroom or home (Nastasi & Hitchcock, 2016). Indirect influences from other parts of the ecosystem also impinge on the child within the microsystem—these include exosystem, mesosystem, macrosystem, and chronosystem. Briefly, the exosystem is the context in which the microsystem is embedded (e.g., the school that encompasses the classroom). The mesosystem refers to the interaction of these systems (e.g., family and school communication). The macrosystem is the larger society or community that characterizes the social, political, or cultural context (e.g., federal or local education policies, community violence). The chronosystem refers to the history of the child, that is, prior experiences of the child (e.g., early development) and his or her social-cultural-historical context (e.g., history of racism, migration). Finally, the child is an active agent within his/her ecosystem and, thus, influences the environment that also influences him or her. It is this bidirectional interaction that is critical to development and well-being. The EST as a conceptual foundation influenced our use of the ecomap as the tool for understanding the child’s ecology (social-cultural network) from his or her perspective...
The ecosystem also is relevant to our model of psychological well-being, which we explore in the next section.

Figure 1. Child’s ecological system. Depiction of the social ecology of the child based on Bronfenbrenner’s (1989, 1999) Ecological Systems Theory (EST). The microsystem (white inner circle) is the immediate context in which the child is interacting with key social agents, for example, with teachers and classmates in school. The exosystem (outer grey circles) refers to the systems that encompass the microsystem and have indirect influence on the child and the interactions within the microsystem (e.g., school [light grey], school district [darker grey]). The mesosystem refers to the connections or interactions between systems (e.g., between school and family, or between micro- and exo-systems within school; indicated by arrows) that have indirect influence on the child and the interactions within the microsystem. The macrosystem refers to the societal or global level, specifically, the social, cultural, political, and economic factors that influence the systems in which the child functions (e.g., cultural values influence expectations within the school district, school, and classroom, and the interactions of child with teacher and classmates). The chronosystem refers to historical and developmental factors that influence the child (e.g., early developmental experiences, community or family history). Note that interactions are bidirectional, including the child’s direct interactions within the microsystem. The bidirectionality of interactions across the ecological system contributes to the dynamic and complex nature of the social ecology (Nastasi & Borja, 2016a, p. 7).

Figure from School-based mental health services: Creating comprehensive and culturally specific programs (p. 40), by B. K. Nastasi, R. B. Moore, and K. M. Varjas (2004), Washington, DC: American Psychological Association. Copyright 2004 by the American Psychological Association. Adapted with permission.

Model of Psychological Well-Being

To frame our early understanding of psychological well-being (PWB), we adopted the conceptual model depicted in Figure 2 (Nastasi et al., 1998), which was based on existing theory and research about mental health at individual and population levels, and was articulated in our research in Sri Lanka. The model depicts the interaction of individual and cultural factors as determinants of PWB. The key constructs are defined in Table 1 (Nastasi & Borja, 2016a) and we highlight here those that are particularly relevant to the ecomap: Individual—culturally valued competencies and personal resources; cultural—social-cultural stressors and resources. Briefly, culturally valued competencies are those characteristics, abilities, and behaviors valued within the child’s social ecology;
these can become sources of stress (e.g., because of pressure to develop and excel) or sources of support (e.g., because they generated caring or approval responses from adults). Personal resources are those competencies relevant to adaptation and coping with stress. Social-cultural stressors are those ecological factors that cause distress and tax personal resources. Social-cultural resources are sources of social supports in the ecology. Our understanding of these constructs was initially based on the perspective of the researcher, informed by existing theory and research. Our understanding, evolved through research and development work with children, adolescents, and their socialization agents (e.g., teachers, parents) who provided the perspective of the cultural member, informed by experiences within their social-cultural ecologies. A critical tool in that work was the eco-map, a graphic depiction of the child’s social ecology and related narratives.

Rights-Respecting Research

In response to critiques of the validity of research that fails to represent child voices, Alderson (2012; see also Hart, 1992) advocated for approaches to research that respect child rights as articulated in the Convention on the Rights of the Child (CRC; UNICEF, 1989). Rights-respecting approaches are those that ensure active child participation in any research that will affect children (cf. CRC participation rights) (Alderson, 2012; see also Keat, Strickland, & Marinak, 2009). In addition to identifying and using methods for eliciting child views, researchers must view children as competent knowers and sources of knowledge who can contribute to our understanding of psychological phenomena (Murris, 2013; see also Broström, 2012; Nastasi, 2014). Furthermore, methods must be developmentally, culturally, and contextually sensitive (Dalli & Te One, 2012), criteria that we explore in the next section.

Culturally Sensitive Research

Discussion of culturally sensitive research necessitates definition of the term culture. For our purposes, culture refers to “a dynamic system of meanings, knowledge and action, which provides individuals with socially sanctioned strategies to create, interpret, analyze, and recreate their world and experiences through their interactions with each other” (Nastasi, Arora, & Varjas, 2017, p. 138; see also Nastasi et al., 2015). At an individual level, culture is reflected in one’s interpretation of meaning, knowledge, and actions; that is, one’s perspective or worldview. Furthermore, culture at an individual level reflects an integration of cultural experiences from multiple social contexts over the course of development, as articulated in Bronfenbrenner’s (1989, 1999) EST. Thus, culturally sensitive research must be able to capture the integrated perspective of the individual as it relates to the phenomenon of interest (e.g., stress and support). D’Augelli (2003) advocates for the use of mixed methods to achieve culturally sensitive research: “qualitative methodologies to map the nature of relevant cultural meanings ... complemented by quantitative methods so that ideographic [sic] and nomothetic perspectives can be integrated” (p. 348).

Table 1. Individual and Cultural Constructs Depicted in Psychological Well-Being Model (Figure 2)

<table>
<thead>
<tr>
<th>Individual Constructs</th>
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<tbody>
<tr>
<td>Culturally valued competencies refer to personal characteristics, abilities, aptitudes, skills, or behaviors that are valued in the culture, that is, valued by key socialization agents (e.g., parents, teachers, peers) in the child’s ecological system and/or the society.</td>
</tr>
<tr>
<td>Personal vulnerability refers to the risk factors specific to the individual and reflected in personal or family history, for example, prior school failure, disability, or genetic predisposition to depression (as reflected in familial history of depression).</td>
</tr>
<tr>
<td>Personal resources refer to the competencies or capacity of the individual that enable adaptation to the demands of the environment (ecological system) and facilitate coping with stressful situations.</td>
</tr>
<tr>
<td>Cultural norms refer to the shared standards of behavior within a particular group or cultural context that may influence personal development (e.g., gender norms).</td>
</tr>
<tr>
<td>Socialization agents refer to the significant stakeholders in the child’s ecology who influence development and functioning, such as key individuals in the child’s microsystems (e.g., parents, peers, and teachers).</td>
</tr>
<tr>
<td>Socialization practices refer to the methods used by socialization agents to influence the child, for example, modeling, discipline strategies, teaching strategies.</td>
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</tbody>
</table>

Note: These definitions are taken verbatim from Nastasi and Borja (2016a, pp. 8-9).
Figure 2. Conceptual model of psychological well-being. This model of psychological well-being, based on existing theory and research, guided formative research to identify culture-specific definitions of key constructs and subsequent development of the culture-specific model of psychological well-being for Sri Lanka, and serves as the guiding framework for the Psychological Well-Being Globally (PPWBG) Project (Nastasi & Borja, 2016a, p. 8).


Integrated Conceptual Framework

Consistent with D’Augelli’s (2003) depiction of MMR as yielding integration of idiographic and nomothetic perspectives, we sought to use the ecomap to yield an integrated etic-emic view of child psychological well-being. Etic refers to the view of the outsider—the researcher, theoretician, clinician, policy maker. Emic refers to the view of the insider—the research participant, client, constituent, cultural member. The integration of these views can yield a perspective that reflects what we know based on theory, research, practice, and policy in combination with the perspective and experiences of the population we are attempting to represent. In developing the ecomap as a mixed methods tool, the etic view was informed by an ecological-developmental perspective on child development and well-being and a conceptual model of psychological well-being that accounts for individual and cultural factors, and includes a commitment to rights-respecting and culturally sensitive research. The emic view was informed by research and development work (described herein) across several studies using the ecomap to capture the phenomenological perspective of children and adolescents across multiple cultures. The evolution of our research not only informed our conceptual understanding, but also contributed to the
identification and further development of the ecomap as a mixed methods tool to facilitate culturally, contextually, and developmentally sensitive research. In subsequent sections, we describe our conceptual framework (etic view) and the use of the ecomap to capture children’s perspectives and experiences in their own voices (emic view), and as a method for effective communication between child/adolescent participants and adult researchers (Nastasi, 2014). We begin with the evolution of the MMR-ecomap tool within a 20-year research and development program.

**Evolution from Intervention Activity to MMR-Ecomap Tool**

The development of the ecomap research protocol began within a research and development program focused on promoting psychological well-being in Sri Lankan schools in 1990s, and progressed to the current use of the ecomap as a MMR tool. During different phases of our research program, we used the ecomap as a qualitative elicitation technique for ethnographic, phenomenological, and participatory action research; as a quantitative indicator of student well-being; and as a developmentally, culturally and contextually sensitive and adaptable mixed methods tool for exploring stress and coping in international research. In this section, we first describe the basic ecomap protocol and then discuss how the ecomap evolved from an intervention activity for promoting psychological well-being of children in Sri Lanka to an MMR tool for conducting international (multi-country) research. What we initially envisioned as an intervention tool that met developmental, cultural, and contextual needs in one context became a research tool that was sufficiently adaptable for research in a multi-country study, across a broad age range (children, adolescents, and young adults) and diverse cultures and contexts. We cite publications that can provide readers with more detail about use of the ecomap for both intervention and research. (A full presentation of study methods and findings across the multiple studies is beyond the scope of this article.)

**Using the Ecomap**

An ecomap provides a graphic depiction of an individual’s social network. Although an ecomap can be used to depict diverse aspects of a social network, we use the ecomap protocol to generate depictions of stress and support within the child’s social ecology. Figure 3 provides a sample ecomap, depicting stressful and supportive relationships, which is part of our standard protocol for intervention and research (Nastasi & Borja, 2016b). Figure 4 provides instructions on how to draw the ecomap. We provide an overview in this section; for a full description of ecomap administration protocol, see Nastasi and Borja (2016b).

Borja et al. (2017) describe the ecomap:

... as a paper-and-pencil drawing that individuals create to (a) depict the relationships that comprise their current social networks; and (b) to highlight their appraisals of those relationships as stressful, supportive, or ambivalent [both stressful and supportive] (Nastasi, Jayasena, Summerville, & Borja, 2011). In most cases, a corresponding interview is conducted to provide additional details and/or narratives about the relationships depicted (e.g., Tsibidaki & Tsamparli, 2007), but a handful of studies have demonstrated the promise and utility of the tool without the corresponding interview (e.g., Rickert & Rettig, 2006). As an open-ended qualitative tool, the ecomap is highly adaptable to a variety of cultural settings, cultural groups, and to individuals of different cognitive and developmental abilities (e.g., Hodge & Limb, 2011). (p. 3)

In our ecomap protocol (Nastasi & Borja, 2016b), children are provided with paper and pencils, markers, or crayons; then they are asked to: (a) draw a picture of themselves in the center, and (b) draw pictures to represent the people (and/or contexts, events) that are important to them. There is no restriction on the number or type of representations. Next, children are asked to indicate the appraisal (quality) of each relationship by drawing lines that connect themselves to each person/event depicted, using a straight line (______) to depict a supportive relationship, a line of Xs (XXXXX) to depict a stressful relationship, or both to depict a relationship that they characterize as both stressful and supportive (i.e., ambivalent; XXXXX). Third, they are asked to label the drawings, denoting the type of relationship (e.g., parent, sibling, friend, teacher), any associated feelings, and reasons for identifying the relationship as stressful, supportive, or both. In the instance of young children, they are permitted to label and describe drawings orally, and the researchers record the response on the drawing. After the drawings are completed, all children are asked to generate two narratives about relationships depicted in the ecomap, one about a stressful experience and another about a supportive one.

The researcher/administrator provides structure to facilitate completion of the ecomap drawing task. The researcher’s role includes presenting the task, explaining its purpose, demonstrating the requirements of the task, and providing developmentally appropriate definitions of stress and support (see Figure 4). In addition, the researcher can clarify directions, ask questions to clarify children’s graphic depictions or verbal responses, and prompt for relationships across different contexts (e.g., school, home, neighborhood). Thus, the task is intended to be collaborative, with the child taking the lead on what to depict and how.

What we have described in this section is the standard protocol, but we have used modifications across our research program. For example, in an intervention program (Nastasi et al., 2010), we asked students working in small groups to depict the social ecology of their school to represent a consensus on the social relationships (stressful, supportive, both). In another study, we developed a simplified protocol for use with young children (ages 4-8) that involves breaking the task into smaller units administered over several brief sessions, using pictures to help define terms (e.g., faces depicting expressions of stress and support), and recording the child’s oral responses (e.g., Bell, Verlenden, Swift, Henderson, & Nastasi, 2016; Summerville, 2014). (Copies of this modification can be obtained from the first author.) Finally, in a multi-country study, the research protocol was translated to the local language and children completed the task in their native language (the process of translation is described in Nastasi & Borja, 2016b). The most significant modification has been in our approach to data analysis, which progressed over time from qualitative to quantitative to mixed methods, and is the primary focus of this article.

Ecomap as Intervention Activity

We first used the ecomap as a culture-specific intervention activity in a mental health promotion program for the general population of students in Grades 6 through 11 (ages 10 to 17 years) in Sri Lanka (Nastasi et al., 2010). The decision to use the ecomap was based on formative research conducted with students, teachers, and administrators from 18 schools in Sri Lanka’s Central Province (Nastasi et al., 1998). Based on the formative research, we designed an intervention with the primary goal of facilitating coping with stress. The ecomap was
selected based on the cultural importance of the self in relationship to others, that is, the sense of interconnect-
edness or embeddedness within the social context of family, school, peer group, and/or community. At that
time, the ecomap had been used primarily as a clinical tool to assess family relationships (Hartman, 1978/2003,
1995), and we adapted it for our purposes.

The researcher is asked to follow a script (Nastasi & Borja, 2016b) to instruct children and adolescents on the
drawing the ecomap. Variations are permitted to adapt to developmental (cognitive) level. A modified version
for young children is available from the first author.

Introduce Ecomap

• Say, “The purpose of today’s activities to talk about the people and events that are important to you, for
example, in your home, school, community. And to do a drawing that shows your relationships with these
people and events—we call the drawings “ecomaps.””

• Demonstrate the ecomap, using the sample [see Figure 3]:
  Draw an ecomap and say, as you draw,
  1. “For example, we all belong to families. You can use a circle to represent your family.”
  2. “Inside the circle, you can draw small circles or other shapes to show who is in your family.”
  3. “We can use lines to show how we feel about the relationship with family members.” Introduce and define
how to depict—stressful, supportive, ambivalent (both stressful and supportive). [Use the following
definitions to introduce the concepts]

<table>
<thead>
<tr>
<th>Stressor</th>
<th>someone or something that creates difficulty or distress for you; makes you unhappy or angry or scared, etc.</th>
</tr>
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<tbody>
<tr>
<td>Support</td>
<td>someone or something that provides comfort for you; makes you feel happy or safe or loved, etc.</td>
</tr>
<tr>
<td>Ambivalent</td>
<td>someone or something that creates both difficulty and comfort</td>
</tr>
</tbody>
</table>

  4. “We can use similar drawings to show other relationships, for example, in school or with friends, etc.”
  5. “We can also use drawings to show things that happen in the community or environment that affect you,
for example, a community celebration, neighborhood conflict, the weather.”

(Nastasi & Borja, 2016b, pp. 28-29)

Figure 4. Instructions for Introducing the Ecomap to Children and Adolescents.

Within the intervention, the ecomap provided a context for identifying stressors and social supports in key eco-
logical contexts (community, family, school, peer group). The ecomap was the stimulus for defining stressful
and supportive relationships while also describing associated feelings, thoughts, and behaviors. To facilitate the
identification and practice of coping strategies, we used a narrative or story-based approach. Students individ-
ually or collectively (in small groups) developed scenarios based on their ecomaps and depicted these scenarios
in written, oral, or graphic form, or via role play. The activities were facilitated by teachers, with training and
consultation provided by the intervention team led by a school psychologist and teacher educator. Five of six
intervention modules included ecomap activities that focused on stress and coping in different ecological con-
texts (Module 2 did not include an ecomap activity): overall social ecology (Module 1), school ecomap (Module
3), family ecomap (Module 4), peer ecomap (Module 5), and integrated social ecology (life ecomap, Module 6).
As part of the program evaluation of the intervention, we conducted qualitative analyses of the narratives asso-
ciated with Module 6 ecomaps to identify stressors, related emotions, coping strategies, related adjustment
difficulties, and resolution of stress (i.e., whether stress was reduced or eliminated via coping strategies). (See
Nastasi et al., 2010, for a full report.)

We subsequently adapted the intervention for a post-tsunami intervention in Sri Lanka’s Southern Province
(conducted 15 to 18 months after the tsunami), with the goal of promoting psychological well-being. One of the
modifications was the inclusion of an additional, environmental, ecomap for the purposes of exploring stressors and supports in the physical environment (e.g., weather-related), and facilitating identification of communal coping strategies (i.e., how community members can work together in times of stress or crisis). As part of the program evaluation, we analyzed the ecomaps and related narratives for students in Grades 5, 7, and 9, to explore whether the intervention provided the context for exploring both tsunami-related and non-tsunami (but developmentally, culturally, and contextually relevant) stressors. (See Nastasi et al., 2011 for a full report.)

The ecomap was an effective tool for generating depictions of stressors, supports, and related narratives of coping. In the process of our initial program implementation (see Nastasi et al., 2010), we realized the potential utility of the ecomaps and narratives for data collection about stress, supports, coping, and adjustment difficulties. We used the student products from the intervention (ecomaps, narratives) for qualitative analysis in the context of program evaluation (Nastasi et al., 2010; Nastasi et al., 2011). This serendipitous discovery led to our subsequent use of the ecomap as a developmentally, culturally, and contextually relevant research tool within a multi-country study of psychological well-being, which we describe in the next section.

**Ecomap as Elicitation Technique**

In 2006, we initiated a multi-country collaborative research project, the PPWBG project, which was a joint effort of school and educational psychologists affiliated with the International School Psychology Association (ISPA) (Nastasi & Borja, 2016b). The purpose of this multi-year project was to explore the construct of psychological well-being (PWB) from the perspective of local stakeholders (students, parents, teachers, school administrators, and support staff) across multiple sites. In recognition of the potential developmental, cultural, and contextual variations in construct definitions, we initiated a qualitative research study, using ethnographic methods—focus groups, interviews, and ecomaps. The ecomaps were used as an elicitation technique to gather data from students (grades K-12) about stressors, supports, and coping strategies. We developed a standardized, yet adaptable, protocol based on the earlier intervention work in Sri Lanka, and described in the Ecomap Protocol section of this article. The team of researchers collected data in 14 sites across 12 countries, as follows

The sites by country included Brazil (Manaus), Estonia (Tallinn), Greece (Athens), India (Mumbai), Italy (Padua), Mexico (Xalapa), Romania (Bucharest), Russia (Samara), Slovakia (Kocise), Sri Lanka (Negombo), Tanzania (Arusha), and three USA sites exemplifying different U. S. ethnic populations—Boston, Massachusetts (Asian American); Mayaguez, Puerto Rico (Hispanic American); New Orleans, Louisiana (African American). (Nastasi & Borja, 2016a, p. 2)

Each site-specific researcher was responsible for translation of the protocol to local language, data collection, translation of data to English, and transmission to the central project site at Tulane University in New Orleans. We also developed a standardized protocol for analysis of data to generate culture-specific construct definitions relevant to the PWB conceptual model (see Figure 2 and Table 1) (Nastasi & Borja, 2016b). Data analysis was conducted by central project site staff (New Orleans) in collaboration with site-specific partners to ensure accurate interpretation of data. In this section, we describe the approaches to qualitative and quantitative analyses. Subsequently, we describe the mixing of qualitative and quantitative data.

**Qualitative analyses.** Qualitative analyses of ecomaps involved coding of the drawings for (a) quality of relationship (stressful, supportive, ambivalent), (b) type of relationship (e.g., parents, siblings, teachers, friends), and (c) verbal descriptions of quality designation (e.g., associated emotions, reasons for designation). In addition, narratives (stories generated by respondents) about stressful and supportive experiences were coded both deductively and inductively. Qualitative analyses of ecomaps involved a 4-step process: (a) deductive coding, (b) inductive coding, (c) pattern analysis within sites, and (d) convergence analysis across sites and participant groups.

**Deductive coding.** First, deductive coding was completed using a set of *a priori* codes. Specifically, we developed codes based on the constructs from the conceptual model depicted in Figure 2: culturally valued competencies, stressors, supports (social resources), reactions to stressors, and reactions to supports. These code categories were deliberately broad in focus to allow for the next step of inductive coding. For example, *Stress/Stressor* was defined by Nastasi and Borja (2016b) as

Any reference to sources that elicit distress for the child. The key idea is that the child perceives the thought, person, object, etc. as a stressor. If the object is thought to impede education, hinder development, or be a risk factor but the child does not perceive it as a stressor, then do not code as stressor. (p. 21)
Support/Social Resource was defined by Nastasi and Borja (2016b) as

Any reference to resources or sources of social support available in the child’s sociocultural environments that can facilitate coping and address psychological problems or provide some type of help or support. Includes both informal social supports (e.g., family, peers, teachers, pets, religious deities) and formal supports or professional services (e.g., from school counselor, psychiatrist). Also includes sources of support indicated on ecmaps. When coding ecmaps, sources of support can be people, places, animals, events, and other child identified ideas. (p. 21)

Stressor and support codes could reflect both individual and cultural factors related to psychological well-being (see Figure 2). For example, stressor could refer to personal vulnerabilities, culturally valued competencies, cultural norms, socialization practices, or social-cultural stressors that the participant identified as sources of distress. Similarly, the code support could reflect participant identification of personal resources, culturally valued competencies, social-cultural resources, or socialization practices as sources of comfort. The identification as stress or support was dependent on the child’s interpretation of the experience as eliciting distress or comfort, respectively.

**Inductive coding.** The second stage of qualitative coding was inductive and involved clustering “deductively coded statements into culture-specific themes” (Nastasi & Borja, 2016b, p. 21). The purpose of this step was to permit identification of variations in the major codes across age, gender, culture, and context; and yielded 51 support themes and 59 stress themes across 13 sites (N = 604 students ages 4-19; Borja, 2015; Borja et al., 2017).

**Pattern and convergence analysis.** Qualitative pattern and convergence analyses of themes constituted the third and fourth stages of coding. First, themes were examined to identify patterns at the site-specific level to reflect local cultural, contextual, and developmental variations (see Nastasi & Borja, 2016b). Then, site-specific themes were examined to identify levels of convergence for specific themes across site, age, and gender groups (Borja, 2015; Borja, Nastasi, Adelson, & Siddiqui, 2016; Borja et al., 2017). Degrees of convergence were defined as high (> 75% of ‘groups’ included the theme), moderate (51% - 74%), low (25% - 50%), minimal (< 25%), or site specific (present in only one site). This qualitative convergence analysis facilitated the identification of common (“universal”) versus unique (“culture-specific”) themes. For example, the highest levels of convergence provided evidence for interpersonal interactions and relationships as the most common sources of both stress and support; this pattern was evident across focus groups (Borja et al., 2016) and ecomap (Borja, 2015; Borja et al., 2017) data.

The ecomap as an elicitation technique served multiple research purposes. The initial purpose was for ethnographic research on psychological well-being (PPWBG project), to capture the variation across development (primary, middle, secondary school), culture (14 local sites in 12 countries), and context (different segments of the child’s ecosystem). The Tulane team used ecomap data as part of participatory action research projects in local schools; the triangulation of student ecomap data with focus group data from students, parents, and school staff informed mental health programming in two elementary schools (see Bell, Larrazolo, & Nastasi, 2017; Bell, Summerville, Nastasi, Patterson, & Earnshaw, 2015; Bell et al., 2016). Finally, a re-analysis of cross-site ecomap data from PPWBG project was used to explore children’s phenomenology about stress and support within their social ecologies (Borja, 2015; Borja et al., 2017).

**Quantitative analyses.** Quantitative analyses of ecomap depictions were conducted to facilitate further understanding of children’s social networks, and thus enhance the qualitative findings. Initial quantitative (descriptive) analyses of ecmaps were conducted to portray social network size, proportions for different relationship types (e.g., % of total represented by family, peer), and stress-support balance indices (SSIs) for total network and by relationship type. Network size refers to the total number of relationship depicted. To calculate SSI, we coded each relationship numerically, with 1 = supportive, 1.5 = ambivalent (stressful and supportive), and 2 = stressful. For each child, numerical codes across relationships were summed, and the sum divided by total number of relationships, thereby controlling for variations in network size (Nastasi & Borja, 2016b; Summerville, 2014). In addition to descriptive data, the quantification of the network data made possible (a) comparisons across sites, gender, developmental level, and types of relationships (e.g., Negotan, Glaveanu, & Stanuvescu, 2016; Perkins, Wood, Varjas, & Vanegas, 2016); and (b) exploration of the relationship between SSI and other indicators of well-being (e.g., standardized social-emotional-behavioral scales, grades, Summerville, 2014; self-reported perceived competencies, Borja, Hitchcock, & Nastasi, 2010). In the next section, we describe the mixing of qualitative and quantitative analyses within a concurrent mixed methods phenomenological design. The application of the mixed methods design to the multi-country data set facilitated understanding of the ecomap as a research tool that both ensured active child participation (thereby honoring child voice) and application across developmental, cultural and contextual boundaries (thereby honoring individual, cultural and contextual variation).
Ecomap as Developmentally, Culturally, and Contextually Adaptable MMR Tool

The PPWBG project provided a unique opportunity to examine the utility of the ecomap as an adaptable MMR tool for identifying developmental, cultural, and contextual variations in stress and support (Borja, 2015). Using a mixed methods concurrent phenomenological design, Borja re-analyzed ecomap drawings and related narratives for 604 students across 13 sites (Mexico site was excluded, due to absence of narratives) to identify convergent and divergent cross-cultural patterns in students’ experiences of stress and supports within their own social networks, using the 3-stage (deductive, inductive, pattern analysis) process described in the previous section. Analyses yielded cross-age, cross-gender, and cross-site patterns in children’s descriptions of their network size, types of relationships, quality of relationships (stress, support, ambivalent), embeddedness (i.e., SSI), and type by quality of relationship. The value of an adaptable MMR tool was evident in the emergence of developmental, gender, and site variations related to the construct of social support (Borja et al., 2017). As noted in the previous section, relationship themes showed high to moderate convergence. However, most support themes had low to minimal convergence, suggesting that cultural and contextual factors might be influential. In addition, story details revealed qualitative differences across themes; for example, material support was defined in most sites as gift-giving. In the Tanzanian site, material support was defined as necessities such as food and water, likely a reflection of the harsh economic conditions. Through this work, the ecomap demonstrated its utility for identifying quantitative as well as qualitative patterns of similarities and differences.

Conclusion

In our work with children in international contexts, the ecomap has demonstrated its utility as an effective, rights-respecting, culturally sensitive, and developmentally adaptable intervention and MMR tool. Specifically, as an intervention tool used in Sri Lanka, the ecomap engaged children and adolescents (ages 10-17) in expressing their perceptions of themselves as connected to others (Nastasi et al., 2010). Within a post-tsunami intervention in Sri Lanka, the ecomap provided information about stressors related to tsunami experiences, both immediate (e.g., separation from family, witnessing death and destruction) and long-term (displacement, loss of home and possessions) (Nastasi et al., 2011). Thus, the same tool could effectively generate stressors and supports related to normal developmental challenges as well as traumatic experiences.

Within a multi-country study, the ecomap as an MMR tool generated rich descriptions about children’s ecological systems and their stressors and supports across a wide range of developmental (ages 4-20), cultural (Americas, Europe, Asia, Africa), and contextual (school, family, peer group, community) variations (Nastasi & Borja, 2016b). With adaptations for developmental level, the ecomap elicited information from children as young as 4 or 5, thereby indicating the potential for gaining self-reports from young children and overcoming the limitation of current measures of child well-being (typically self-report questionnaires not appropriate under the age of 8).

As an elicitation tool, the ecomap generated a wide range of stressors (59 types) and supports (51 types) to represent the diversity of cultural experiences in a multi-country study (Borja, 2015). The combination of quantitative and qualitative analyses of ecomap drawings and accompanying narratives permitted the identification of common and unique stressors and supports within that wide range. Quantitative analysis yielded information about network size, balance of stress and support (SSI), and representation by relationship type (e.g., parents, siblings, teachers). Quantification makes possible identification of nomothetic patterns, such as the average SSI across 14 sites and within specific sites. Understanding the typical balance of stress and support can aid in identification of children with relatively (compared to universal or local norms) high levels of stress or low levels of support, thereby signaling psychosocial risk. Quantification also makes possible comparisons across age, gender, context (school, family), and relationship type (parent, sibling, teacher, friend).

Qualitative analyses permit in-depth idiographic representation of the meaning of stress and support within a social ecology context. The exploration of children’s experiences and perceptions of stress and support within different ecological systems can contribute to our understanding of factors contributing to psychological well-being, thereby facilitating theory development, and advances in research, practice, and policy related to child mental health.

Ecomaps also make possible the examination of social networks and relationships across different parts of an ecological system. For example, in the intervention program in Sri Lanka (Nastasi et al., 2010; Nastasi et al., 2011), we asked students to generate separate ecomaps for microsystems of school, peer group, and family; the physical environment; and their lives in general (“life ecomap”, a compilation across the ecological system). This application in research could facilitate comparisons across key contexts, for example, comparing SSI for family
versus school. Administration of the ecomap over time (beginning and end of school year) or as a pre-post measure for an intervention could provide data about changes in the balance of stress and support. The combination of quantitative and qualitative data can facilitate examination of changes as well as explanations for those changes.

The application of the ecomap and the ecomapping process has not been without its limitations. As an MMR research tool, replication studies are necessary to identify the extent to which the ecomap can generate rich qualitative and quantitative data in other contexts. Current studies have been encouraging (e.g., Borja et al., 2017; Nastasi et al., 2011), and MMR researchers who work with children in international contexts may consider building on the current literature about the ecomap’s utility as an MMR tool. Necessary adaptations to standardized procedures also need to be explored. Currently, our team is continuing to explore the wide-range of uses and information that the ecomap offers, including its use as a tool for generating information about children’s coping strategies and reactions to supports. Another application we are currently exploring is the use of the ecomap as a mental health screening tool, especially with young children, which in combination with other data sources (parent report, teacher report, school performance indicators), can facilitate identification of children at risk and needing preventive interventions. Additionally, efforts are underway to triangulate ecomap data with focus group data to: (a) compare the types of information garnered from each data set, (b) enhance the authenticity of findings, and (c) generate a mixed methods formative basis for the development of standardized self-report measures (e.g., perceived competencies, Hitchcock et al., 2005; Hitchcock et al., 2006; stress and coping, Nastasi, Hitchcock, Burkholder, et al., 2007).

The ecomap as an MMR tool offers opportunities for exploring other questions. The ecomap could be used to examine children’s perspectives on other aspects of the PWB model (Figure 2), such as cultural norms or socialization agents and practices, across different segments of the ecosystem (micro-, exo-, meso-, macro-, and chrono-systems). In addition, strength of relationships and levels of stress and support could be explored. For example, we observed that children spontaneously indicate levels of stress by varying the number of Xs; alternatively, researchers could introduce a scale for depicting levels of stress and support, or strength of relationship. Finally, the ecomap as an elicitation tool affords children the opportunity to express ideas that researchers might fail to consider a priori. For example, we envisioned the ecomap as an indicator of relationships with other people in children’s lives, but children spontaneously (across sites) included pets, toys, events, activities, media, and so forth. The open-ended nature of the ecomap thus provides the researcher with a unique opportunity to understand the world of children.

To date, acceptability and feasibility studies of the ecomap’s use with children in international settings have not been conducted, and this gap in research poses an additional limitation to the ecomap as a tenable MMR tool. Although our observations (and those of our international partners) of children’s engagement and comfort with the ecomapping process suggest acceptability (e.g., Borja, 2015), future researchers can explore children’s perspectives about the ecomap as an intervention and research tool. To the authors’ knowledge, only one feasibility and acceptability study about one variation of the ecomap was conducted with children (ages 7–10) in the United States (Driessnack, 2009). Specifically, by deriving themes from children’s narratives and from ethnographic observations, she concluded that the child version of the colored eco-genetic relationship map was easy to understand and use. However, children’s perspectives about the ecomap were not generated, and future studies can assess the extent to which children enjoyed the activity and understood the task. Additional studies can also assess the extent to which the activity is feasible, given a specific locale’s context.

In conclusion, what was envisioned as an intervention activity within a program to promote psychological well-being evolved into a developmentally, culturally, and contextually adaptable mixed methods research tool for application in local and global research. The ecomap, a self-generated graphic depiction of one’s social network and narratives about the network, turned out to be an effective research tool with applications in ethnographic, phenomenological, participatory action, and cross-cultural research with children and adolescents. The value of the ecomap was seen in the capacity to generate an understanding of a child’s ecology in his/her own words, thereby facilitating representation of children’s voices to inform research, theory, practice, and policy that will affect them.

Notes

1. The terms “tool,” “technique,” “measure,” and “instrument” will be used interchangeably to represent a standardized procedure for data collection.
2. Many existing measures of psychological constructs rely on self-report questionnaires and preclude the participation of children under the age of 8 years due to cognitive and language requirements (Borja et al., 2017; Nastasi, 2014).
3. Adelson, Maitra, and Nastasi (2017); Bell et al. (2017); Bell et al. (2015); Borja et al. (2017); Hitchcock et al. (2005); Hitchcock et al. (2006); Nastasi and Borja (2016b); Nastasi, Hitchcock, Burkholler, et al. (2007); Nastasi, Hitchcock, Sarkar, et al. (2007); Nastasi et al. (2010); Nastasi and Jayasena (2014); Nastasi et al. (2011); Nastasi et al. (2004); Nastasi et al. (1998).

4. A full description of project rationale, procedures, and site-specific and cross-site findings from student data can be found in Nastasi and Borja (2016b).

References


