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INVESTIGATING THE EFFECTIVENESS OF RESILIENCE INTERVENTIONS IN AUSTRALIAN YOUTH AND ITS VARIABILITY ACROSS REFUGEE AND NON-REFUGEE SAMPLES

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Author Note

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The ability to flourish and achieve positive outcomes in spite of adversities has been a growing topic of interest in psychology. Given the perpetuity with which we encounter stress and adversity in our lives, there is no doubt that resilience has direct and significant impacts on our mental wellbeing. While resilience is a critical skill for every age group, it is particularly important during the developmental phases of childhood and adolescence, when individuals are confronted with substantial changes in their biological, social and cognitive functioning (Cohen et al. 2015). The conflicts and dilemmas that arise from these changes must be effectively reconciled in order for young people to develop into healthy adults, for the problems experienced during youth are often sustained into adulthood and later life (King, Vidourek & Merianos 2016). While clinical interventions may not eliminate the adversities that children or adolescents experience, they certainly have the capacity to mitigate the effects of adversities through enhancing individuals' resilience.

Understanding Resilience

Early work on resilience primarily focused on the individual's internal qualities (Luthar, Cicchetti & Becker 2000); however, growing research in the area brought to attention the impact of environmental factors in shaping resilience (Worsley 2014). A holistic integration of these different views leads to a consensus that resilience is a multifaceted construct—it is the repertoire and complex interaction of various protective and risk factors (Miller, Worsley & Hanstock 2016), which include the inherent qualities of the individual, external

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factors such as family environment and social networks (Hjemdal et al. 2006; von Soest et al. 2010), and the individual's capacity to capitalise on these resources (Miller, Worsley & Hanstock 2016). As phrased by Hjemdal and colleagues (2006, p. 84), resilience is the 'conceptual umbrella' for factors, both internal and external, that ultimately 'modify the impact of adversity'.

Grotberg (1995), in her study of children from 14 impoverished countries, defined psychological resilience as the universal capacity that allows a person, group or community to prevent, minimise or overcome the damaging effects of adversity. A simpler definition of resilience is the ability to navigate and negotiate with one's social ecology (Ungar & Liebenberg 2009). Both definitions reflect the change in resilience research over time and consider the interactive nature of development of psychological resilience.

However, it seems that there are three levels of dynamics involved in the process of resilience. These are personal characteristics that help individuals overcome adversity, environmental influences that contribute to the personal characteristics and the interactions between the two, which may either hinder or enhance resilience, ultimately affecting an individual's response to adversity.

Using these three dynamics, this paper refers to resilience as the process of continual development of personal competence while negotiating one's available resources in the face of adversity (Worsley & Hjemdal 2017). This definition of resilience can be divided into three interacting measurable parts:

1 The development of personal competence
2 Navigating with available social resources
3 Facing adversity

The Resilience Doughnut Model

Current models of resilience agree that the various protective and risk factors that constitute resilience are situated both internally and externally. They adopt the views of the ecological model, which conceptualises individuals as being embedded in multiple layers of contexts (Bronfenbrenner & Morris 2006). The individual actively explores within and interacts with their social ecologies, and as a result endows power to their social contexts to shape the expression of their resilience.

Different models of resilience construct different lists of the exact factors that comprise resilience and offer different explanations for the mechanism by which these factors shape resilience (Worsley 2014). One such example is the Resilience Doughnut model (Worsley 2006) which conceptualises resilience as taking the form of a doughnut. The inner circle represents the internal characteristics of the individual, and the outer circle represents the external resources to which the individual has access. Specifically, the inner circle reflects individuals' key beliefs relating to three areas: 'I am', which portrays individuals' self-perceptions; 'I can', which represents their belief in their own abilities; and 'I have', which is the awareness of their external resources (Grotberg 1995). The outer circle is segmented into seven different domains from which individuals access their resources. These domains are parent, skill, family, education, peer, community and money. The positioning of internal and external factors as two concentric circles represents an active interaction between the two spheres. Resilience is developed when the external factors foster the development of internal strengths (Miller, Worsley &

Figure 40.1 The Resilience Doughnut Model.
Source: Worsley (2017).

Hanstock 2016; see Figure 40.1). However, the abundance of all seven forms of resources is not a prerequisite for being resilient. It is proposed that targeting three of the seven factors for each individual would be sufficient to enhance resilience (Worsley & Hjemdal 2020).

Studies using the Resilience Doughnut model have been shown to deliver some positive outcomes. In a series of case studies (Worsley 2014), a programme based on the Resilience Doughnut was implemented through an online tool at three schools, targeting students ranging from 12 to 17 years of age. The programme involved determining one's three strongest resources, then developing a project that utilises these strengths. Students were measured on their levels of anxiety, depression and resilience at various time points: prior to the programme, immediately following the programme, and at 12 and 24 months after the conclusion of the programme. Results showed that students with medium to high levels of anxiety displayed increases in their resilience scores over time. Another study by Miller, Worsley and Hanstock (2016) investigated a more systematic implementation of Resilience Doughnut programmes. It examined the effects of two programmes based on the Resilience Doughnut model. Each of the programmes use experiential learning to activate the children's resource strengths. The programmes Connect 3 (children 8–12 years) and Linked Up (12–16 years) were administered over several sessions in a clinical setting. The study found a significant increase in personal competence and a significant decrease in adversities following the completion of the Connect 3 programme. Overall, the findings of past research provide a good reason to hypothesise the utility of the Resilience Doughnut model. Interventions built on the frameworks of the model appear to deliver some clear and reasonable benefits. It is to these intervention programmes and their operationalisation that we now direct our attention.

Programmes Based on the Resilience Doughnut Model

There are currently three programmes derived from the Resilience Doughnut model—Bright Thinking, Connect 3 and Linked Up—that aim to 'enhance resilience in non-clinical child and adolescent populations' (Miller, Worsley & Hanstock 2016, p. 3). The programmes also incorporate the views of positive psychology and solution-focused theory. Positive psychology is a shift from the traditional focus on identifying and repairing damage to a focus on building individuals' positive qualities (Seligman 2002). It recognises that achieving therapeutic success is a twofold process requiring a balance between fixing problems and developing strengths (Seligman 1998). Solution-focused theory is a future-oriented approach to therapy that focuses on developing solutions to achieve one's desired future (De Shazer, Dolan & Korman 2007). These solutions are derived from the individual's own capacities and resources—that is, the clients' own strengths are actively utilised to accomplish their goals for the future. In therapeutic practice, the integration of positive psychology and solution-focused therapy takes the form of interventions that emphasise clients' strengths as opposed to problems, and that mobilise and apply these strengths to the clients' processes of change (Corcoran & Pillai 2009). This is an underlying feature of the Resilience Doughnut programmes.

The interventions are differentiated based on programme content and target age. The Bright Thinking programme targets children aged 8–12 years and aims to enhance resilience through teaching an optimistic thinking style. It proposes that children are fixed to a pessimistic mindset, whether desired or not, because they lack the capacity to change. Thus, the intervention assists in developing the skills necessary to transition from a pessimistic to an optimistic cognition. The programme runs for one hour over six weeks. Each week the children practise solution-focused skills with each other. Each week, they ask each other what they hope for that week and what has gone well in the previous week, and then scale their progress from 0 to 10. They then go through various aspects of optimistic thinking, such as attributing adversities to temporary, specific or caused by other factors. There are role plays and games using scenarios of other children's dilemmas, and the children then teach their parents the skills they learn. Neither the children nor the facilitators are aware of the children's presenting problems but rather illicit what individual changes will be noticed if the group goes well (Worsley 2017).

The Connect 3 programme also targets children aged 8–12, with the fundamental goal of building their resilience through empowering them. That is, the programme assists the children in discovering their personal strengths and encourages them to use these strengths to build positive connections with others. The planned outcome is an improvement in self-confidence as well as interpersonal skills. The Connect 3 programme runs for 1.5 hours over six weeks. The programme helps children to find their strong doughnut strengths using the Resilience Doughnut model. They learn about the model and help each other think of a kindness project that will tap into their strong connections and relationships. Each week brings in aspects of resilience, such as optimistic thinking and altruism, and in the final week, they present the kindness project to their families and parents (Worsley 2012a).

The Linked Up programme explores the same topics as the Connect 3 programme but targets adolescents aged 13–16 years and has been tailored appropriately for the said age group. Overall, these programmes share the goal of enhancing the children's resilience via a range of implementation strategies, through which they ultimately seek to alter the course of their developmental trajectories (Worsley 2012b).

The Connect 3 and Linked Up programmes have been examined regarding their efficacies (Miller, Worsley & Hanstock 2016); however, the Bright Thinking programme is yet to be investigated. All programmes have been manualised to ensure consistency of the delivery.

Sociocultural Considerations: A Specific Case of Refugees

In the present study, the accessibility of the programmes discussed above have been expanded to the refugee population. As defined by the United Nations, a refugee is 'a person who is outside his/her country of nationality or habitual residence with a well-founded fear of persecution' and an inability 'to avail himself/herself of the protection of that country' (*Convention Relating to the Status of Refugees* 1951). The refugee group in this present study include children with or without their families, who represent a unique sociocultural status, one that offers an array of adverse experiences with implications for their mental wellbeing (Ringold, Burke & Glass 2005). This includes, but is not limited to, traumatic events experienced prior to migration, mandatory detention, separation from their cultural roots, adjustment to and possibly incompatibility with the new culture, language barrier, racial discrimination and compromised education (Schweitzer et al. 2006). In relation to the seven external factors defined by the Resilience Doughnut, departure from the country-of-origin cuts access to communal resources. Barriers in communication may obstruct career prospects (Schweitzer, Greenslade & Kagee 2007) and lead to monetary difficulties. For young refugees, their relative lack of language barriers may burden them with responsibilities for the family that create tensions in their relationships with their parents (Reedy 2007). Racial discrimination, a common experience among young refugees in school settings, may hinder the development of positive relationships with peers (Brough et al. 2003). The lack of a comprehensive national policy regarding the education of refugee children and adolescents creates educational contexts that are not conducive for learning and growth. Taken together, the refugee experience undoubtedly involves no shortage of adversities. Of interest is whether these adversities, often impeding access to external resources, hinder the development of resilience in therapeutic settings. Examining the different ways in which refugees and non-refugees respond to resilience-based interventions can enhance our understanding of the mechanisms by which various external factors influence an individual's expression of resilience. This allows us to develop programmes that are socioculturally sensitive in order to maximise their efficacies across a wide range of populations. Moreover, examining how the refugee group overcome the various adversities arising from their status will deepen our appreciation of the mechanisms of resilience at work—that is, how negative life experiences do not invariably lead to negative outcomes.

The Present Study

Although the Resilience Doughnut model has been researched and evidence of its therapeutic utility has been found, this present study is the first to investigate the effects of the Bright Thinking programme on resilience, personal competence and responses to adversity. Because of this gap in research, it is necessary to conduct confirmatory research that can establish and add further support to the efficacy of the Resilience Doughnut programmes.

Furthermore, it would be of worth to examine how the effects of the programmes differ for two distinct sociocultural groups that vary in their levels of adversities. This inquiry

would not only create a better understanding of the mechanisms by which resilience is expressed but also allow for the development of 'culturally competent programs' that account for 'individual and community needs' (Davidson, Murray, & Schweitzer 2008, p. 18).

As an additional inquiry, the present study sought to compare the effects of two programmes targeted at the same age group: the Bright Thinking and Connect 3 programmes. This is an advancement from previous studies, which have not directly compared across different interventions. The analysis would reveal to us how different implementations of the Resilience Doughnut lead to different therapeutic outcomes. Ultimately, the overarching goal of the present study was to generate a range of findings that enable the refinement and improvement of the resilience-based programmes.

Hypotheses

First, we hypothesise that there will be significant increases in resource and resilience and significant decrease in adversity following each of the programmes. This hypothesis derives from our general expectations for the programmes, as well as empirical evidence from past investigations (Miller, Worsley & Hanstock 2016; Worsley 2014; Worsley & Hjemdal 2017). The remaining inquiries—that regarding the differential responses of refugees and non-refugees, and that regarding the different effects of Bright Thinking and Connect 3 programmes—are not guided by any a priori hypotheses because they are exploratory in nature and have not yet been investigated in past literature.

In regard to the dependent variables—resource, resilience and adversity, each of which comprise a number of factors—we expect positive correlations between factors of resource and resilience, negative correlations between factors of resource and adversity, and negative correlations between factors of resilience and adversity. That is, we expect that experiences of adversity will decrease when resource availability and resilience increase, based on the conception of these variables.

General Method

Participants

Participants of the study comprised children and adolescents enrolled into one of the Bright Thinking, Connect 3 and Linked Up programmes. Parents completed consent forms alongside their child, permitting the collection of their child's data and its use in the research project. Data was collected and protected in encrypted files with the Resilience Centre and stored for 25 years. Those who did not provide their consent were still able to participate in the programmes. Participants for each of the programmes belonged to either the Centre group or the Refugee group—the former referring to those who completed the programmes at the Resilience Centre, Sydney, and the latter referring to refugee students who attended the programmes in their school settings. Refugee status was determined by the participating schools and teams at Mount Druitt, Plumpton and Doonside, using criteria set by the Department of Social Services. They were either born in Australia to humanitarian parents or migrated as infants.

The complete data set included 261 participants in total, with 65 participants in the Bright Thinking group (25%), 125 in the Connect 3 group (48%) and 71 in the Linked Up group (27%). There were 179 participants in the Centre group (69%) and the remaining

82 participants were in the Refugee group (31%). Because many participants did not complete either their pre-intervention or their post-intervention data, only 169 participants had no missing data. Of these, 31 were enrolled in Bright Thinking (18%), 94 in Connect 3 (56%) and 43 in Linked Up (26%), and 108 were part of the Centre group (64%) and 61 were part of the Refugee group (36%).

It is also worth noting the participants' socio-economic backgrounds, which varied systematically across the Centre and Refugee groups. Participants who completed their programmes at the Resilience Centre in Epping, Sydney, New South Wales, were of high socio-economic status, with the local area ranking in the highest deciles on all four Socio-Economic Indexes for Areas (SEIFA) measures (Australian Bureau of Statistics [ABS] 2016). Meanwhile, participants in the Refugee group came from low to middle socio-economic backgrounds, with one local area ranking between 4 and 6 deciles on the SEIFA measures, and the other local areas ranking in the lowest deciles, between 1 and 2 (ABS 2016).

Materials

Resilience Doughnut Measure

The Resilience Doughnut measure, based on the frameworks of the Resilience Doughnut model (Worsley 2006, 2017, Worsley and Hjemdal 2020), aims to determine individuals' resource availabilities and maps their abilities to deal with adversities. It categorises protective factors into seven external resources—parent, skill, family, education, peer, community and money. The scale consists of 70 items—ten for each of the seven factors—rated on a 6-point Likert scale that ranges from 0 (*disagree very strongly*) to 5 (*agree very strongly*). Higher scores are taken to mean greater resource availability. The score for each factor is an average of the scores on items that comprise the factor.

Internal reliability, as determined using data generated in the current study, was found to be acceptable with an overall Cronbach α of .87, and alpha values for each of the factors ranging between .77 and .90.

Resilience Scale for Adolescents

The Resilience Scale for Adolescents (READ; Hjemdal et al. 2006) is a questionnaire measuring levels of resilience in adolescents. It is an adaptation of the Resilience Scale for Adults (Hjemdal et al. 2001) that has been simplified for use with the adolescent population. The scale consists of 28 positively worded items, separated into five subscales—personal competence, social competence, structured style, social resources and family cohesion. Items are rated on a 5-point Likert scale ranging from 0 (*totally agree*) to 4 (*totally disagree*). Higher scores indicate higher levels of resilience. The score for each subscale is an average of the scores on items that comprise the subscale.

The READ demonstrates strong internal consistency with a Cronbach α of .94 for the total score. Each of the individual subscales was also shown to display acceptable to high internal consistencies with Cronbach α ranging between .70 and .90 (Hjemdal et al. 2006; von Soest et al. 2010). Scores on each of the subscales were found to have significant negative correlations with depressive and anxiety symptoms (Hjemdal et al. 2007), supporting the construct validity of the scale.

Strengths and Difficulties Questionnaire

The Strength and Difficulties Questionnaire (SDQ; Goodman 1997) is a behavioural screening measure for children that provides a representation of both their strengths and their difficulties in relation to their behaviours, emotions and relationships. The scale serves an array of functions in the clinical setting, including the detection of those at high risk of developing mental health problems (Goodman 2000) and as a measurement of treatment outcomes (Goodman 2001). It is suitable for ages 4–16 and can be answered via self-report from ages 11 to 16. The questionnaire consists of 25 positively and negatively worded items, with five items tapping each of the five dimensions—emotional problems, conduct problems, hyperactivity, peer problems and prosocial behaviour. Items are rated using a 3-point Likert scale ranging from 0 (*not true*) to 2 (*certainly true*), indicating the extent to which each statement applies to the respondent. This excludes five items that follow a reverse scoring system. The score for each subscale is a summation of the scores on the items that comprise the subscale. A higher score reflects more of the relevant dimension. A total difficulties score is generated by adding up the scores for emotional problems, conduct problems hyperactivity and peer problems. In the present study, the SDQ was used as a measure of participants' adversities. Higher scores on emotional problems, conduct problems, hyperactivity, peer problems and total difficulties suggested higher levels of adversities, whereas a higher score on the prosocial scale reflected greater social strength. The SDQ displays satisfactory internal consistency with a Cronbach α averaging at .73 across the subscales (Goodman 2001). However, the internal consistency for self-reported peer problems was found to be low ($\alpha = .41$). The scale also demonstrates good validity in screening for individuals at high risk of developing mental health problems (Goodman 2000).

Procedure

The three programmes—Bright Thinking, Connect 3 and Linked Up—were run multiple times between the years 2015 and 2018 with approximately 6–10 participants in every run. The Linked Up and Connect 3 programmes consisted of six weekly sessions lasting 1.5 hours each. The Bright Thinking programme consisted of six weekly sessions lasting one hour each.

All programmes were delivered by trained psychologists who followed programme structures outlined by manuals. Parent information sessions were held following the first programme session, allowing parents to engage with the activities included in the programmes. Following the remaining sessions, the contents of each session and guidance on how they may be implemented in home and school settings were provided to parents through letters.

The Resilience Doughnut measure, READ and SDQ were administered to the participants one week prior to the commencement of the programmes to record their pre-intervention scores. The same measures were administered again following the termination of the programmes 11 weeks later, yielding participants' post-intervention scores. Questionnaires were completed using a computer device. Participants had the option of completing the measures at home or during a pre-screening session at the centre. It is unknown whether any participants were required to complete the questionnaires through other means in the case that computers were not available. Participants who had difficulties understanding the questions were prompted with explanations by the trained psychologists who delivered the programmes.

All statistical analyses were performed using *IBM SPSS Statistics for Windows* (2017).

Study 1

In the first study, we sought to examine the general effectiveness of each of the three resilience programmes.

Method

Three paired samples *t*-tests were run for each of the intervention programmes, comparing pre- and post-intervention scores for every subscale measured in the Resilience Doughnut, READ and SDQ.

Results

Bright Thinking

Results show a significant decrease in mean emotional problem scores by 1.40 points, t (29) = –3.09, p = .00, d = .56, and a significant decrease in mean total difficulties score by 3.13 points, t (29) = –2.95, p = .01, d = .54 (see Table 40.1).

Connect 3

There were significant increases in the scores for all the subscales in the Resilience Doughnut Quiz. On average, scores on the parent factor increased by 0.21 points, $t(93)$ = 3.60, p = .00, d = .37; skill factor increased by 0.24, $t(93)$ = 4.43, p = .00, d = .46; family factor increased by 0.19, $t(93)$ = 3.63, p = .00, d = .37; education factor increased by 0.15, $t(93)$ = 2.14, p = .04, d = .22; peer factor increased by 0.26, $t(93)$ = 2.74, p = .01, d = .28; community factor increased by 0.22, $t(93)$ = 2.54, p = .01, p = .26; and money factor increased by 0.30, $t(93)$ = 3.72, p = .00, d = .38 (see Table 40.2).

As for the READ subscales, personal competence increased by 0.19 points on average, $t(93)$ = 2.50, p = .01, d = .26; social competence increased by 0.23 on average, $t(93)$ =, p = .02, d = .25; and family cohesion increased by 0.22 on average, $t(93)$ = 2.82, p = .01, d = .29. Changes in social resources scores approached statistical significance, with a mean increase of 0.15 points, $t(93)$ = 1.94, p = .06, d = .20 (see Table 40.2).

On the SDQ measure, there was a significant decrease in the mean emotional problems score by 0.63 points, $t(93)$ = –2.94, p = .00, d = .30. Changes in the total difficulties scores were approaching statistical significance, with a mean decrease of .84, $t(93)$ = –1.84, p = .07, d = .19 (see Table 40.2).

Linked Up

There were significant increases in two of the subscales in the Resilience Doughnut Quiz. The mean skill factor score increased by 0.25 points, $t(42)$ = 2.72, p = .01, d = .42), and the mean family factor score increased by 0.28 points, $t(42)$ = 2.11, p = .04, d = .32. Increases in parent and community factor scores were approaching statistical significance, with a mean increase of 0.21 points for both factors, $t(42)$ = 1.93, p = .06, d = .29; $t(42)$ = 1.93, p = .06, d = .29 (see Table 40.3).

Table 40.1 Comparison of Pre and Post-Intervention Scores for Bright Thinking

Variable	*Pre M*	*Post M*	*Difference*	*p*	*Cohen's d*
Resilience doughnut					
Parent factor	4.22	4.31	0.10	.40	.16
Skill factor	4.14	4.17	0.03	.81	.04
Family factor	4.12	4.26	0.14	.34	.18
Education factor	4.30	4.24	_0.06	.64	.09
Peer factor	4.02	4.08	0.06	.65	.08
Community factor	3.66	3.75	0.09	.45	.14
Money factor	3.71	3.82	0.11	.28	.20
Read					
Personal competence	2.74	2.81	0.07	.46	.14
Social competence	2.78	2.93	0.15	.09	.32
Structured style	2.71	2.83	0.12	.37	.17
Social resources	3.41	3.30	_0.11	.23	.23
Family cohesion	3.33	3.32	_0.01	.89	.03
SDQ					
Emotional problems	4.87	3.47	_1.40	.00**	.56
Conduct problems	3.37	2.90	_-0.47	.09	.32
Hyperactivity	6.07	5.40	_0.67	.14	.28
Peer problems	5.37	4.77	_0.60	.10	.31
Prosocial	8.17	8.17	0.00	1.00	.00
Total Difficulties	19.67	16.53	_3.13	.01**	.54

**$p < .01$

No significant changes were found for any of the READ subscales; however, an increase in the mean personal competence score by 0.17 points was approaching significance, $t(42) = 1.92$, $p = .06$, $d = .29$. On the SDQ measure, there was a significant decrease in emotional problems by 0.61 points on average, $t(42) = -2.40$, $p = .02$, $d = .37$ (see Table 40.3).

Discussion

It was hypothesised that there would be significant increases in measures of resources (Resilience Doughnut) and resilience (READ), and significant decreases in adversities (SDQ) following each of the interventions. Consistent with the hypothesis, we found that the scores on a range of resource and resilience factors increased whereas the scores on one of the adversity factors decreased. However, the three intervention programmes displayed different patterns of results.

The Bright Thinking programme yielded significant decreases in emotional problems and total difficulties while producing no significant increases in resources and resilience. The Connect 3 programme displayed the greatest success, leading to significant increases in all measured resource factors as well as three of the five resilience factors: personal competence, social competence and family cohesion. The programme also led to a significant decrease in emotional problems. These findings are consistent with and add to the findings of past research that revealed significant increases in personal competence following the programme (Miller, Worsley & Hanstock 2016).

Table 40.2 Comparison of Pre and Post-Intervention Scores for Connect-3

Variable	*Pre M*	*Post M*	*Difference*	*p*	*Cohen's d*
Resilience Doughnut					
Parent factor	4.03	4.24	0.21	.00**	.37
Skill factor	4.08	4.32	0.24	.00**	.46
Family factor	4.15	4.35	0.19	.00**	.37
Education factor	4.18	4.33	0.15	.04*	.22
Peer factor	3.91	4.17	0.26	.01*	.28
Community factor	3.51	2.74	0.22	.01*	.26
Money factor	3.64	3.94	0.30	.00**	.38
Read					
Personal competence	2.69	2.89	0.19	.01*	.26
Social competence	2.70	2.93	0.23	.02*	.25
Structured style	2.80	2.93	0.14	.11	.17
Social resources	3.23	3.39	0.15	.06	.20
Family cohesion	3.07	3.29	0.22	.01**	.29
SDQ					
Emotional problems	4.61	3.98	_0.63	.00**	.30
Conduct problems	3.93	3.93	0.00	1.00	.00
Hyperactivity	5.90	5.86	_0.04	.83	.02
Peer problems	5.49	5.32	_0.17	.38	.09
Prosocial	7.85	7.79	_0.06	.76	.03
Total Difficulties	19.93	19.09	_0.84	.07	.19

*$p < .05$. **$p < .01$

Our findings suggest that the Connect 3 programme is particularly successful in facilitating the growth of personal strengths as well as the development of positive connections with one's social ecologies. Following the Linked Up programme, there were significant increases in perceived skill and family resources. Unlike the Connect 3 programme, however, no significant changes were found in any of the resilience factors, consistently with the findings of Miller, Worsley and Hanstock (2016). Given that the Linked Up and Connect 3 programmes follow the same structure and content, the differences in results may be due to the nature of the age groups to which the programmes were directed. One possible inference is that the programmes demonstrate greater efficacy for children than for adolescents in developing resilience. However, the Linked Up programme led to a significant decrease in participants' emotional problems—a new finding that has not been established by past research.

Interestingly, all three intervention programmes were successful in reducing emotional problems but not any other individual subscales of adversities. This suggests that the resilience programmes exhibit particular strength in alleviating emotional problems as opposed to other forms of adversities. Of the three programmes, the Bright Thinking programme alone led to significant reductions in total adversities. Given that the Bright Thinking and Connect 3 programmes dealt with children of the same age group, the former may be a more effective implementation for alleviating general experiences of adversity in that particular age group.

In interpreting these results, it is important to recall that our data set was derived from a non-clinical sample. Mean scores on adversity subscales were not clinically high and the

Table 40.3 Comparison of Pre and Post Intervention Scores for Linked Up

Variable	*Pre M*	*Post M*	*Difference*	*p*	*Cohen's d*
Resilience doughnut					
Parent factor	3.75	3.96	0.21	.06	.29
Skill factor	3.71	3.96	0.25	.01**	.42
Family factor	3.68	3.97	0.28	.04*	.32
Education factor	3.79	3.79	0.01	.97	.01
Peer factor	3.52	3.74	0.21	.08	.28
Community factor	2.89	3.10	0.21	.06	.29
Money factor	3.47	3.52	0.05	.65	.07
Read					
Personal competence	2.36	2.53	0.17	.06	.29
Social competence	2.41	2.51	0.11	.20	.16
Structured style	2.36	2.53	0.18	.12	.25
Social resources	2.95	2.96	0.00	.96	.01
Family cohesion	2.74	2.80	0.06	.41	.13
SDQ					
Emotional problems	5.91	5.30	_0.61	.02*	.37
Conduct problems	3.77	3.95	0.19	.44	.12
Hyperactivity	5.51	5.95	0.44	.13	.24
Peer problems	5.47	5.72	0.26	.31	.16
Prosocial	7.42	7.49	0.07	.78	.04
Total Difficulties	20.65	20.93	0.28	.67	.07

*$p < .05$. **$p < .01$

majority of scores fell within a middle to low categorical range. Mean scores on the Resilience Doughnut and READ scales also showed no substantial lack of resilience and resources. Thus, the lack of statistically significant changes in the majority of the measured factors does not come as a surprise in a sample that was not drastically problematic to begin with. Our findings may not be generalisable to clinical populations, whose baseline profiles may differ.

Study 2

The second study sought to compare the Refugee and Centre groups regarding their responses to the intervention programmes. No a priori hypothesis was available because this study was exploratory.

Method

For each of the Connect 3 and Linked Up programmes, a (2) × 2 mixed ANOVA model was used to compare the Centre and Refugee groups regarding their changes from pre- to post-intervention. As for the Bright Thinking programme, because of the lack of post-intervention data from the Refugee group, changes in pre- and post-intervention scores could not be compared across Centre and Refugee groups. Instead, a one-way ANOVA model was used to compare pre-intervention scores between Centre and Refugee groups. Welch tests were used in place of one-way ANOVA for any data that violated the equality of variances assumption.

Results

Connect 3

Results show that there were no significant differences between the Centre and Refugee groups in terms of pre- to post-intervention changes (see Table 40.4). However, difference between the two groups regarding changes in structured style scores approached statistical significance, $F(1, 92) = 3.38$, $p = .07$, $\eta^2 = .03$ (see Table 40.4). Whereas scores from the Refugee group increased over time, scores from the Centre group decreased marginally (see Figure 40.2). Difference between the groups regarding changes in hyperactivity scores was also approaching significance, $F(1, 92) = 3.42$, $p = .07$, $\eta^2 = .04$. Scores for the Refugee group increased over time, whereas scores for the Centre group decreased (see Figure 40.3).

Linked Up

There were significant differences between the Refugee and Centre groups in regard to the changes in education scores, $F(1,41) = 4.65$, $p = .04$, $\eta^2 = .10$, and peer problems scores, $F(1,41) = 6.30$, $p = .02$, $\eta^2 = .13$, from pre- to post-intervention (see Table 40.5). For the education factor, the Refugee group displayed a decrease in scores over time, whereas the Centre group displayed an increase (see Figure 40.4). For the peer problems factor, the opposite pattern was observed (see Figure 40.5).

Table 40.4 Interactions between Time and Refugee-Status for Connect3

Variable	*F*	*p*	η^2
Resilience doughnut			
Parent factor	1.42	.24	.01
Skill factor	2.40	.13	.02
Family factor	0.53	.47	.01
Education factor	0.20	.66	.00
Peer factor	0.22	.64	.00
Community factor	1.52	.22	.02
Money factor	0.25	.62	.00
Read			
Personal competence	0.58	.45	.01
Social competence	0.15	.70	.00
Structured style	3.38	.07	.03
Social resources	0.04	.85	.00
Family cohesion	0.14	.71	.00
SDQ			
Emotional problems	1.71	.19	.02
Conduct problems	0.01	.91	.00
Hyperactivity	3.42	.07	.04
Peer problems	0.16	.69	.00
Prosocial	0.00	.98	.00
Total Difficulties	0.00	1.00	.00

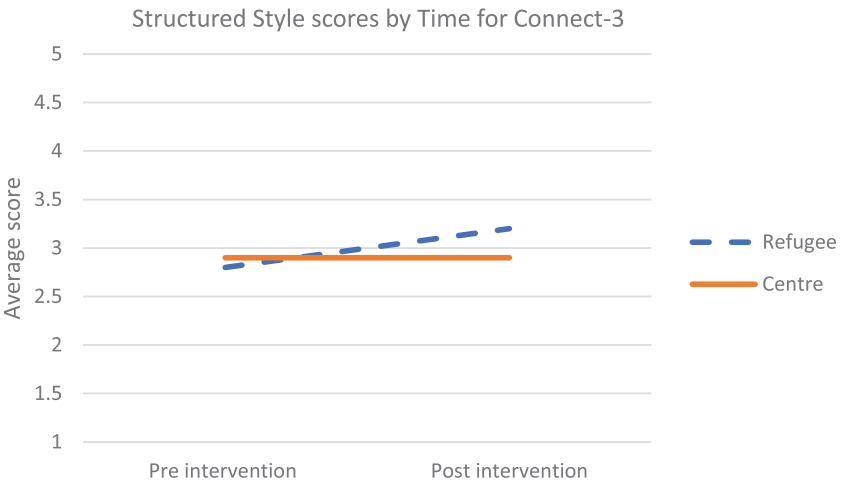

Figure 40.2 Structured Style Scores by Time for Connect-3.

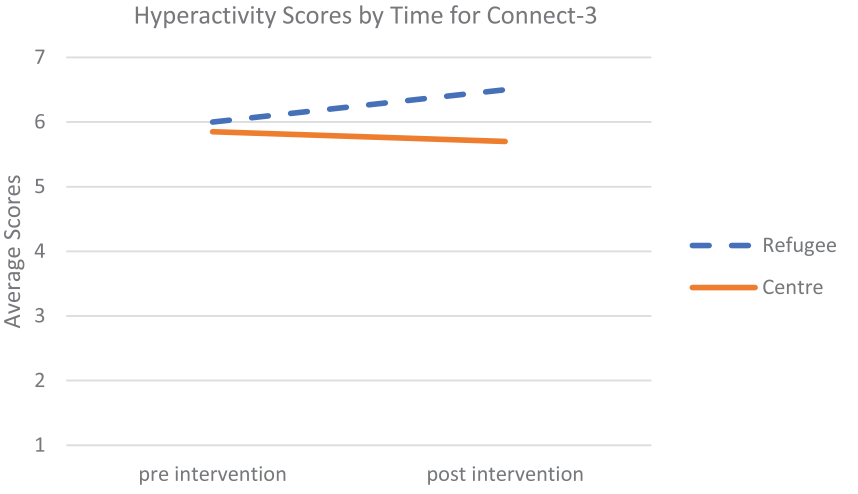

Figure 40.3 Hyperactivity Scores by Time for Connect-3.

Bright Thinking

The baseline scores of Refugee and Centre groups differed significantly on a number of factors. The Centre group scored significantly higher than the Refugee group on the parent factor by 0.50 points on average, $F(1,62) = 4.97$, $p = .03$, $\eta^2 = .07$. Scores on family cohesion were also found to be significantly higher for the Centre group by 0.63 points on average, $F(1,62) = 6.41$, $p = .01$, $\eta^2 = .09$ (see Table 40.6).

Table 40.5 Interaction between Time and Refugee-Status for Linked-Up

Variable	*F*	*p*	η^2
Resilience doughnut			
Parent factor	0.03	.85	.00
Skill factor	0.73	.40	.02
Family factor	1.04	.31	.02
Education factor	4.65	.04*	.10
Peer factor	0.72	.40	.02
Community factor	0.00	1.00	.00
Money factor	0.70	.41	.02
Read			
Personal competence	1.70	.20	.04
Social competence	1.15	.29	.03
Structured style	0.06	.81	.00
Social resources	0.77	.39	.02
Family cohesion	2.84	.10	.06
SDQ			
Emotional problems	1.69	.20	.04
Conduct problems	0.01	.95	.00
Hyperactivity	0.10	.75	.00
Peer problems	6.30	.02*	.13
Prosocial	0.66	.42	.02
Total Difficulties	1.57	.22	.04

*$p < .05$

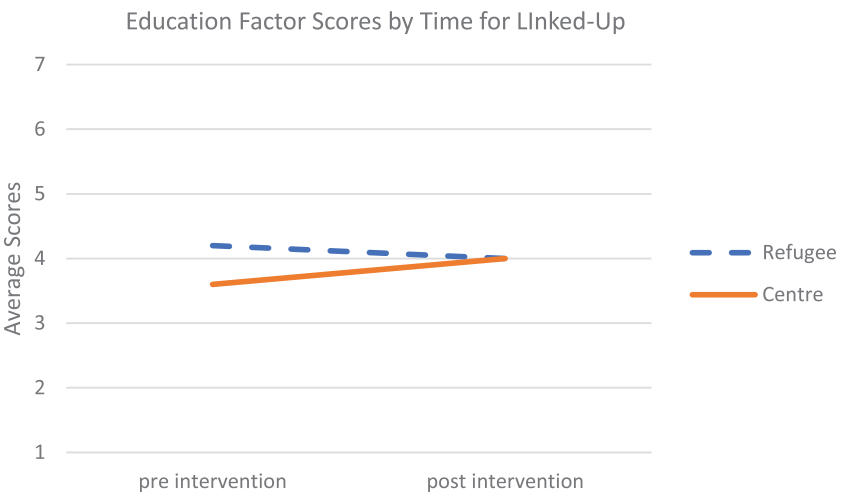

Figure 40.4 Education Factor Scores by Time for Linked-Up.

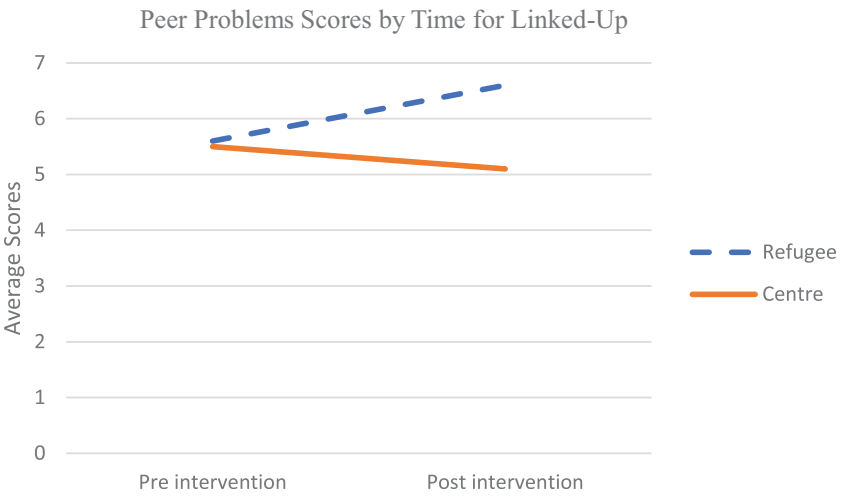

Figure 40.5 Peer Problems Scores by Time for Linked-Up.

Table 40.6 Comparison of Pre-Intervention Scores between Refugee and Non-Refugee Groups for Bright Thinking

Variable	*F*	*p*	η^2
Resilience doughnut			
Parent factor	4.97	.03*	.07
Skill factor	0.12	.74	.00
Family factor	0.42	.52	.01
Education factor	1.17	.28	.02
Peer factor	0.05	.83	.00
Community factor	0.56	.46	.01
Money factor	1.65	.20	.03
Read			
Personal competence	.66	.42	.01
Social competence	.84	.36	.01
Structured style	1.21	.28	.02
Social resources	0.18	.67	.00
Family cohesion	6.41	.01*	.09
SDQ			
Emotional problems	1.10	.30	.02
Conduct problems	0.28	.60	.00
Hyperactivity	0.97	.33	.02
Peer problems	0.79	.38	.01
Prosocial	1.25	.27	.02
Total Difficulties	0.76	.39	.01

*$p < .05$

Discussion

The second study was interested in examining how the Refugee and Centre groups exhibited different responses to the intervention programmes. Because the inquiry was an exploratory one, there were no a priori hypotheses to define our expectations. For the Connect 3 programme, there were no significant differences between the two groups in terms of pre- to post-intervention changes. Meanwhile, the Linked Up programme yielded significantly different outcomes for the two groups with regard to the changes in education and peer problems scores. Specifically, the Centre group displayed an increase in education scores and a decrease in peer problems scores, whereas the Refugee group exhibited the exact opposite outcomes. At face value, these results appear to suggest that the Linked Up programme privileges one group over another. That is, the Centre group, characterised by lower adversities, is implied to derive greater benefits from the programme than the Refugee group, characterised by higher adversities. However, the two groups were found to differ significantly as a result of their opposing directions of change. This runs counterintuitively to the general expectation for clinical interventions to facilitate positive change at the maximum and lack of change at the minimum. Thus, the apparent differences between the Refugee and Centre groups may not be attributable to the intervention itself, but a reflection of inconsistencies in responding over time or other confounding factors such as attendance at school, literacy levels and family disruption that occurred between the two time points of assessment. That is, the observed differences between the two groups may not pertain to our topic of interest. Unfortunately, the potential for history effects is a general limitation of any within-subjects analysis. Alternatively, the unexpected directions of change may truly imply that the Linked Up programme has adverse effects on educational resources and peer problems for marginalised sociocultural groups. However, this is not a likely explanation given that the Linked Up and Connect 3 programmes follow the same content and structure, and no such results were found from the Connect 3 group. It is important to note that this study did not investigate whether the pre- to post-intervention changes were significant within each of the adversity groups. Directions of change were inferred from visual representations of the data and do not confirm that these unexpected changes were meaningful.

In comparing the adversity groups for the Bright Thinking intervention, only the pre-intervention scores could be compared because of the absence of post-intervention data from the Refugee group. Overall, the Centre group displayed higher family cohesion and parent factor sores than the Refugee group. However, these findings have no particular implications for the present inquiries. Future studies should compare the responses of Refugee and Centre groups with the Bright Thinking programme once the post-intervention data become available.

Study 3

The third study was interested in comparing the efficacies of the Bright Thinking and Connect 3 programmes, which targeted children of the same age group.

Method

A (2) × 2 mixed ANOVA model was used to compare the changes in pre- and post-intervention scores between the Bright Thinking and Connect 3 programmes.

Results

Results show that there was a significant difference between the Bright Thinking programme and Connect 3 programme in regard to the changes in total difficulties score, $F(1, 122) = 5.18$, $p = .03$, $\eta^2 = .04$ (see Table 40.7). The mean scores decreased for both interventions, but to a greater extent for the Bright Thinking intervention (see Figure 40.6).

Discussion

This study was interested in comparing the efficacy of two programmes targeted at the same age group: the Bright Thinking and Connect 3 programmes. Again, because the present study was the first to conduct such an examination, there were no a priori hypotheses guiding our expectations. The results inform us that the two programmes do not differ significantly in terms of changes to an individual's resources and resilience. However, there were significant differences in regard to participants' overall adversities, with the Bright Thinking programme yielding greater decreases in total difficulties scores than the Connect 3 programme. This suggests that the two programmes are similarly effective in facilitating the growth of positive qualities in children aged 8–12. However, the Bright Thinking intervention, with its primary focus on transitioning from a pessimistic to an optimistic mindset, demonstrates greater efficacy in reducing negative challenges. In tandem with past research that demonstrates an association between pessimistic thinking and various psychological difficulties (Chaplin, Gillham & Seligman 2009), our findings suggest that a change in one's thinking style is integral to reducing one's difficulties.

Table 40.7 Interaction between Time and Intervention (Bright Thinking and Connect 3)

Variable	*F*	*p*	η^2
Resilience doughnut			
Parent factor	.90	.34	.01
Skill factor	2.33	.08	.02
Family factor	0.19	.66	.00
Education factor	2.14	.15	.02
Peer factor	1.23	.27	.01
Community factor	0.62	.43	.00
Money factor	1.56	.21	.01
Read			
Personal competence	0.69	.41	.01
Social competence	0.18	.68	.00
Structured style	0.02	.90	.00
Social resources	3.21	.08	.03
Family cohesion	2.52	.12	.02
SDQ			
Emotional problems	2.87	.09	.02
Conduct problems	1.69	.20	.01
Hyperactivity	1.97	.16	.02
Peer problems	1.16	.28	.01
Prosocial	0.03	.87	.00
Total Difficulties	5.18	.03*	.04

*$p < .05$

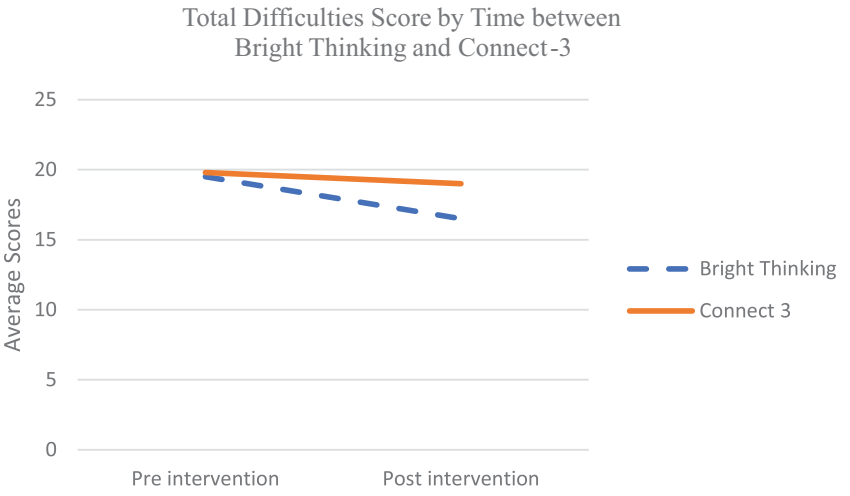

Figure 40.6 Total Difficulties Score by Time between Bright Thinking and Connect-3.

One consideration for this study is the post-intervention data was missing for the Refugee group enrolled in the Bright Thin king programme; hence, they were omitted from the analyses of the study. This means that while the data set for the Connect 3 programme consisted of both Refugee and Centre groups, the data set for the Bright Thinking programme comprised solely the Centre group. Thus, the apparent differences between the two programmes may pertain to systematic differences between the Refugee and Centre groups, such as socio-economic status, as previously discussed. To control for these potentially confounding factors, future studies should be conducted when the post-intervention data for the Bright Thinking Refugee group become available.

Resources, Resilience and Adversities

Method

A correlation matrix for all subscales of the Resilience Doughnut Quiz, READ and SDQ was created using *IBM SPSS Statistics for Windows* (2017).

Results

All factors of the Doughnut Quiz had significant positive correlations with all factors of the READ.

All factors of the Doughnut Quiz, excluding community and money factors, had significant negative correlations with the SDQ emotional problems factor. All factors of the Doughnut Quiz, excluding parent and skill factors, had significant positive correlations with the SDQ hyperactivity factor. Skill and family factors from the Doughnut Quiz had significant positive correlations with the SDQ peer problems factor. All factors of the Doughnut Quiz had significant positive correlations with the SDQ prosocial behaviours factor.

All of the READ factors had significant negative correlations with the SDQ emotional problems factor, and significant positive correlations with the SDQ prosocial behaviours

and hyperactivity factor. Personal competence, social competence and structured style factors from the READ had significant positive correlations with the SDQ peer problems factor (see Table 40.8).

General Discussion

The overarching aim of the present study was to evaluate the effectiveness of three interventions based on the Resilience Doughnut model (Worsley 2006): Bright Thinking, Connect 3 and Linked Up. The efficacy of the programmes was assessed by measuring improvements in children's engagement with their resources, resilience skills and emotional and social difficulties. The Resilience Doughnut programmes contrast with other popular resilience programmes, by focussing on each student's available strong relationships to build their individual resilience skills. The RD programmes use experiential learning, linking students with their social resources to complete a social impact project. Other resilience programmes teach emotional literacy and coping skills through direct teaching methods and engaging seminars using trained facilitators (Project, 2017–2019; Reach-out, 2021). Measures in these programmes appear to be surveys of satisfaction with the teaching methods and students' enjoyment of the programme rather than validated measures of resilience (Reach-out;). The psychometrically validated measures used in this study show reliability using three measures across different domains that affect resilience. These are protective resources, social and emotional competence, and emotional difficulties.

Study 1 conducted a general examination of the outcomes associated with each programme. The expectation for resource and resilience to increase and for adversity to simultaneously decrease was partially met. All programmes effectively alleviated the experience of emotional problems—as expected from a sample struggling with high levels of anxiety. The Bright Thinking and Connect 3 programmes further facilitated the growth of several resource factors. The Connect 3 programme alone led to substantial improvements in resilience factors. Overall, children enrolled in the Connect 3 programme enjoyed the greatest range of therapeutic benefits, which corresponded with the findings of Miller, Worsley and Hanstock (2016) that showed that the Connect 3 programme led to greater improvements than the Linked Up programme. Given that these two programmes are only differentiated based on age, perhaps the content of the programmes work more effectively for younger children than for older youth. This may be due to the need to tailor intervention programmes to the specific needs of adolescents as opposed to a more generic programme, such as the Connect 3 programme, for younger children. Furthermore, the delivery of programmes to adolescents is highly influenced by the relationship to the facilitator, and the results may be more indicative of the level of engagement of the adolescents in the programme. In addition, both the current study and the study by Miller, Worsley and Hanstock (2016) found that the programmes, excluding Connect 3, did not lead to significant changes across the full range of measured factors. This may imply that the programmes are selectively effective at improving specific factors of resource, resilience and adversity. Other factors may require a different or more focused means of influence.

Study 2 investigated the differential effectiveness of the programmes across refugee and non-refugee samples. The two samples represent two distinct sociocultural groups that vary

Table 40.8 Correlation Matrix for the Resilience Doughnut, READ and SDQ Subscales

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*
1. Parentfactor																		
2. Skill factor	.56**																	
3. Family	.64**	.62**																
4. Education	.52**	.65**	.56**															
5. Peer	.37**	.53**	.51**	.61**														
6. Community	.39**	.47**	.50**	.54**	.44**													
7. Money	.48**	.53**	.48**	.47**	.38**	.46**												
8. Personal competence	.33**	.63**	.45**	.49**	.40**	.40**	.46**											
9. Social competence	.32**	.55**	.45**	.49**	.51**	.43**	.43**	.69**										
10. Structured style	.40**	.58**	.47**	..42**	.35**	.39**	.53**	.71**	.61**									
11. Social resources	.44**	.46**	.52**	.42**	.45**	.35**	.37**	.60**	.63**	.57**								
12. Family cohesion	.58**	.49**	.61**	.50**	.40**	.47**	.44**	.63**	.61**	.62**	.70**							
13. Emotional problems	_.16**	_.25**	_.14**	_.12**	_.10*	_.02	_.00	_.30**	_.16**	_.13**	_.16**	_.18**						
14. Conduct problems	_.07	_.03	.07	.04	.05	.09	_.02	.07	.03	.08	.01	_.02	.44**					
15. Hyperactivity	_.01	.08	.14**	.11*	.13**	.11*	.13**	.14**	.16**	.17**	.15**	.12*	.37*	.39**				
16. Peer problems	.00	.11*	.11*	.08	.02	.05	.13**	.14**	.13**	.18**	.07	.00	.36*	.40**	.29**			
17. Prosocial behaviour	.27**	.31**	.31**	.32**	.34**	.21**	.31**	.36**	.50**	.39**	.38**	.38**	.10*	.07	.22**	.24**		
18. Total difficulties	_.10**	_.05	_.05	.02	.02	.07	.07	.03	.03	.07	_.05	_.05	.80	.75	.68**	.66**	.20**	

*$p < .05$. ** $p < .01$

in their levels of experienced adversity. Only the Linked Up programme yielded different outcomes for the two groups, with the non-refugee group showing improvements and the Refugee group showing declines in educational resource and peer problems. However, as discussed, the observed declines in the refugee sample may not be an effect of the intervention. Moreover, the two groups exhibited differences only on a small number of measured factors. At the current stage, it can only be tentatively suggested that the two sociocultural groups differ in their responses to intervention.

Study 3 investigated the effects of two resilience programmes targeting the same age group: Bright Thinking and Connect 3. While both programmes were similarly effective in facilitating the growth of resource and resilience, the Bright Thinking programme demonstrated greater efficacy in reducing the experience of adversities. Because the Bright Thinking programme focuses on the development of positive cognition, it is implied that one's style of thinking is fundamental to the regulation of adversity experiences.

Relationship between Resources, Resilience and Adversities

As expected, measures of resilience (READ) and resources (the Resilience Doughnut Quiz) were significantly correlated. Higher scores on resources were associated with higher scores on resilience. Consistently with previous findings (Miller, Worsley & Hanstock 2016), not all adversity factors (SDQ) were negatively correlated with resilience and resources. Only the emotional problems factor was negatively correlated with all measured factors of resilience and resource. The lack of negative correlations with the other factors of the SDQ may simply reflect the nature of our participants: that they represent an anxious population rather than one with an even spread of adversities.

Strengths

The current study makes some valuable contributions over and above the findings of previous research. It is the first to make an investigation of the Bright Thinking programme, the first to directly compare the efficacies of two resilience programmes and the first to consider the differential effectiveness of the programmes across two sociocultural groups. Findings of the current study may be used to guide the expectations of future investigations, as well as to inform the potential refinements that can be made to the programmes.

The data used in the current study were consistently collected over five years. This has clear benefits over using data from a single run of the programmes because group sizes for individual runs were kept relatively small. As a result, the data set was fairly large and more representative of the population it was drawn from. This method of data collection will benefit future studies because the sample will only increase in size.

Another strength of the study relates back to the nature of the interventions themselves. The Bright Thinking, Connect 3 and Linked Up programmes build on the assumption of resilience as a multifaceted construct, encompassing a multitude of protective and risk factors. They support the use of a broad range of resources to facilitate the development of resilience. Hence, the programmes effectively equip their clients to face the various adversities that emerge in life. At the same time, it should be considered in future investigations whether the focus on a range of resource and resilience domains is more effective than a specialised focus.

Limitations

Despite the many strengths, the current study is not without its limitations. The first limitation concerns its generalisability. Baseline measures of resource, resilience and adversity did not illustrate a highly problematic sample because participants did not display grossly high levels of adversity or demonstrate an outstanding lack of resource and resilience factors. The lack of significant improvements in many of the measured factors may be due to the participants not exhibiting severe problems in the first place. Therefore, the current findings may not be transferable to clinical populations that experience greater problems. Also, the majority of our participants were enrolled in the resilience programmes because of their experiences of anxiety as opposed to other difficulties. Thus, our sample may be more representative of an anxious population than one that experiences a mix of adversities. This imposes further limitations on the generalisability of our findings.

There is a potential presence of language barriers within the refugee sample. This may have undermined the efficacy of the interventions as well as the accuracy of assessment. It will be important to ensure that the assessment tools have been validated for use with various cultural groups.

Another limitation is that the interventions and the assessments were not administered in standardised settings. For the Centre group, the interventions were delivered in the Resilience Centre, a private clinic in Sydney. In contrast, the Refugee group partook in the programmes administered in school settings. In regard to assessment setting, participants had the option of completing the assessments at their homes or during a pre-screening session at the clinic. An array of environmental factors may have influenced the assessment responses. In particular, home environments are not as controlled or private as clinical settings, leading to participants being prone to distractibility. Furthermore, because the study used longitudinal data, its findings may have been subject to a range of temporal influences. This may include unexpected life events or sudden changes in participants' resource availabilities. Differences between pre-intervention and post-intervention scores, or the lack thereof, may be attributed to such events as opposed to the intervention itself. Furthermore, while the data for the Centre group was collected over the last five years, data for the Refugee group was collected only over the last two years. Overtime, as the therapists became more accustomed to implementing the intervention procedures, the quality of the interventions may have slightly improved. In such a case, the Refugee group would have been subjected to improved delivery of the programmes. The differences between the Refugee and Centre groups may have arisen from factors pertaining to the clinicians rather than the clients.

Finally, some demographic information on our participants was not available. This information is important in understanding the make-up of the group samples to gauge whether there could be potential systematic differences to consider. In respect to the current study, information on mean age and gender were missing. Although each intervention programme targeted a specific age range, the mean age of the investigated groups may have been substantially different if the groups were on relatively opposite ends of the age category. Gender imbalances are also of concern. While Miller, Worsley and Hanstock (2016) previously found that there were no significant differences between gender groups, excluding scores on personal competency, we still cannot disregard the possibility of gender effects having occurred in the current study.

Future Directions

Because of missing data from the Refugee group in the Bright Thinking intervention, analysis could not be run to determine whether there were differences between the Centre and Refugee group in regard to pre- to post-intervention changes. It is also important to note that the Refugee and Centre groups were not of equal size, with the Refugee group forming a comparatively small sample. Future studies may continue exploring the same research questions addressed in the current study, but with more balanced and larger sample sizes, and when both pre- and post-intervention data become available. Furthermore, it may be advantageous to translate the three questionnaires to the group's first language, to enable a better understanding of the questions and responses in the data.

Future studies could also investigate the efficacy of the current programmes against other programmes based on different models of resilience. Although the interventions based on the Resilience Doughnut model may be regarded as advantageous because of its broad focus on a variety of domains, it would be worthwhile to test this idea.

Another possible pathway for future studies is to include a control group in addition to the intervention groups. This would allow future studies to have broader clinical implications for the programmes and eliminate temporal influences on factors of interest.

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