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Multi-informant scores and gender differences on the Strengths and Difficulties Questionnaire for New Zealand children

Rebecca J. Sargisson, Peter G. Stanley *University of Waikato,* **Anna Hayward** *Ministry of Education*

The problems of New Zealand youth are significant, and increasing, but early intervention may assist children to avoid negative life outcomes. Teachers, parents, and students of 74 Year 6 children in five New Zealand primary schools completed the Strengths and Difficulties Questionnaire (SDQ). Between 2.7 and 5.5% of children sampled were identified as having total difficulties scores in the "abnormal" range, which is lower than norms established by other samples. Teacher ratings were lower than the ratings supplied by parents, which were lower than those given by students. Teacher ratings also varied by gender, with boys being identified as having more problems than girls. However, parent and student ratings showed little gender bias, suggesting that obtaining multiple informant information on the SDQ is useful, as it appears teachers are providing different information on students than parents or students themselves. We discuss the use of screening procedures, particularly in relation to the Vulnerable Children's initiatives.

Keywords: Strengths and Difficulties Questionnaire, children, identification, gender

The rate of adolescent mental health problems is high and increasing, especially for girls, both in England (Collishaw, Maughan, Natarajan, & Pickles, 2010) and New Zealand (Fleming et al., 2014). Additionally, only a small percentage of youth come in contact with mental health services (Muris, Meesters, & van den Berg, 2003). In a large-scale study of New Zealand secondary school students, 80% of the young people who were experiencing serious mental health problems had not sought help from a health professional (Mariu, Merry, Robinson, & Watson, 2011), with suicidal students, and those with substance-use problems, least likely to seek help. Early intervention can be helpful in reducing mental health difficulties for young people. For example, 14-year old Māori and Pacific students at risk of depression showed lower levels of depressive symptoms after a school-based intervention (Woods & Jose, 2011). Mariu and colleagues (2011) stress the importance of identifying adolescents who are having difficulties so that they may receive help.

Two of the present authors have previously argued that the key to effective and efficient human services for children and youth at risk is the adequacy of the methodology that brings them to notice in the first place. In Stanley and Sargisson (2012), we suggest that the systematic screening of age cohorts of school children is a logical and inexpensive approach to identification that promotes access and equity. Our recent work has focused on understanding how screening 'works' and, in particular, we have sought to find instruments that identify young people who are experiencing personal difficulties with reasonable reliability. In Sargisson, Stanley, and de Candole (2013) we report on the efficacy of early assessments of language skills, physical abilities, reading readiness, and behavioural issues in identifying children who had already been referred to Special Education (Ministry of Education). In this study, we showed the salience of physical abilities as an identifier, and in Sargisson, Powell, Stanley, and de Candole (2014) we describe the relationships that we have found for fine and gross motor scores and a number of other characteristics of children beginning primary school.

Most recently, we were asked to advise on an identification instrument for a Social Sector Trial (Ministry of Social Development). The Strengths and Difficulties Questionnaire (SDQ) was recommended and we took the opportunity to examine the performance of this popular screening device with a New Zealand sample. The SDQ is a 25-item survey with a teacher and parent version, and a student version for children who are 11 years of age and older. It has been extensively researched, is used with many different cultures, and has been translated into 69 languages (Lane, Menzies, Oakes, & Kalberg, 2012). The SDQ has been well received by teachers, who have found the SDQ to be acceptable and meaningful and who liked the fact that there were positive as well as negative items (Fletcher, Tannock, & Bishop, 2001). Moreover, this instrument is brief and simple to administer (Rothenberger & Woerner, 2004). It is also significant that the SDQ has been shown to be able to identify children with problems who might otherwise escape attention (Fletcher et al., 2001).

While there are three versions of the SDQ; teacher, parent, and self-report (student), there has been little research comparing the three informant versions. Many researchers who have used the SDQ have noted as a limitation the fact that they did not use all three informant versions (for example, Capron, Theron, & Duyme, 2007; Di Riso et al., 2010; Johnson, Hollis, Marlow, Simms, & Wolke, 2014; Muris et al., 2003; Rønning, Handegarard, Sourander, & Mørch, 2004; Syed, Hussein, & Mahmud, 2007).

Roberts, Attkisson, and Rosenblatt (1998), in a literature review of the

prevalence of psychiatric disorders of children and adolescents, state that it is important to obtain information from different informants, as it might lead to different estimates of the prevalence of psychiatric disorders. In a study of Norwegian foster children (Lehmann, Heiervang, Havik, & Havik, 2014), a higher mean SDQ total difficulty score (14.7) resulted from the parent version compared to the teacher version (11.9) but teacher and parent versions resulted in similar incidences of abnormal scores for 5 – 11 year old Pakistani children in a different study (Syed et al., 2009).

Teachers are more likely to report problems related to discipline and classroom behaviour (conduct and hyperactivity) whereas parents are more likely to report emotional symptoms (Syed, Hussein, & Haidry, 2009). Thus, teachers may provide important information on externalising problems, which may be useful in identifying conduct and hyperactivity problems, but may not be helpful in identifying internalising problems, such as depression. For example, Johnson et al. (2014) found that parents of 11-year old pre-term children in the UK and Ireland reported higher levels of problems on the SDQ with emotions, attention, and peer problems than teachers, while teacher ratings of conduct problems were more accurate than parent ratings. Johnson et al. conclude that the best predictions of mental health difficulties were achieved with multiple versions.

Rønning et al. (2004) recommend that, when used as a screening tool, a minimum of two informant versions should be used. They warn against using the self-report version in isolation, as self-report questionnaires are subject to various biases, such as social desirability. Goodman, Ford, Corbin, and Meltzer (2004) found that the best screen for psychiatric problems of British children in care is achieved by using all three versions but, if this is not possible, the parent and teacher combination is better than a combination of two ratings which includes the self-report SDQ. More evidence that the self-report SDQ should not be used in isolation was provided by Goodman, Meltzer, and Bailey (1998). They found, using only the self-report version, that children who were experiencing problems were not identified, and therefore, they advise that self-report SDQs should be used in combination with another informant version.

Syed et al. (2007) however, hypothesise that, for emotional symptoms, the self-report SDQ ought to produce more valid ratings than those of other informants. Children from a clinical sample aged around 12 years old identified more problems in the self-report SDQ than teachers did (Capron et al., 2007). In a clinical sample of German children, Becker, Hagenberg, Roessner, Woerner, and Rothenberger (2004) found that, overall, self-reports were more similar to parent reports than to teacher reports, and that adding the self-report ratings to either the parent or the teacher ratings improved the ability to predict psychological problems.

Using the SDQ, some researchers have found evidence for a greater prevalence of externalising problems, such as aggression, for boys, and a higher prevalence of internalising problems, such as anxiety and depression, for girls. For example, French boys aged around 12 years had higher scores for conduct and hyperactivity than girls; girls had higher scores for emotional symptoms (Capron et al., 2007). This pattern was evident on both the self-report and teacher versions of the SDQ (Capron et al., 2007). Similarly, using the self-report version of the SDQ, Dutch girls aged around 12 years had higher scores for emotional symptoms and prosocial behaviour but lower scores for conduct problems than boys did (Muris et al., 2003). Using the parent version, boys had higher total difficulties, hyperactivity-inattention and peer problems scores than girls, but girls had higher prosocial scores (Muris et al., 2003). Syed et al. (2009) say that, given that boys are reported to have higher rates of externalising problems than girls, boys may be more likely to be identified by teachers and that girls with emotional problems may be "neglected when it comes to intervention" (p. 626). While the prevalence of externalising problems does not appear to be increasing for adolescents, the prevalence of internalising problems is increasing for adolescent girls and the trend for boys is mixed (Bor, Dean, Najman, & Hayatbakhsh, 2014).

Other results are less equivocal on the presence of gender differences. Syed et al. (2007) found no significant difference between scores of emotional symptoms, peer problems or prosocial behaviour between girls and boys in Pakistan, but did find higher scores for boys on conduct and hyperactivity scales. Syed et al. (2009) reported higher scores for total difficulties, conduct, and hyperactivity for boys using the parent SDQ with Pakistani children, but teacher SDQ scores for the same children found gender differences for only the hyperactivity and prosocial scales, where boys had a higher incidence of problems.

We compared all three informant versions with Year 6 school children (mean age 11 years) in a town in the North Island of New Zealand. We aimed to assess differences in the scores on the SDQ as a function of informant version and also to examine gender differences in scores across informants.

Method

Participants

We invited all Year 6 (approximately 250) children from five primary schools in the research area to participate. From those invited, 38 female and 36 male Year 6 students participated (30% participation rate). Ages ranged from 10 to 11 (M = 11.06, SD = 0.28). Of the 74 children, 45 were Pākehā and 27 Māori. The five schools had decile ratings from 2 to 9, of a possible range from 1 to 10, where 1 represents the lowest 10% of families in terms of socio-economic status, and 10 the highest 10%.

Instruments

We used all three versions of the Australian SDQ for people aged between 11 – 17 years; teacher, parent, and self-report versions for each participating child. While some children in our sample were slightly younger than 11 years old, Curvis, McNulty, and Qualter (2014) found that children as young as 6 were able to complete the SDQ for 11 – 17 year olds. Evidence of reliability of the self-report and teacher versions of the SDQ for 11 – 17 year olds was provided by Capron et al. (2007) and these authors found that both the self-

report, and the teacher, versions of this SDQ discriminated at-risk students from students who were not receiving psychological care or failing in school. The reliability and validity of the SDQ for 11 – 17 year olds has been supported in numerous studies (e.g. Becker, Woerner, Hasselhorn, Banaschewski, & Rotherberger, 2004; Muris et al., 2003; Woerner et al., 2004).

Procedure

We provided information to, and secured willingness to be involved from, school principals during a regular monthly meeting. Information was then included in the school newsletter a week before the research pack containing the parent and child SDQ and a consent form was sent home. Parents who consented to their children participating completed the SDQ, assisted their child(ren) to complete the SDQ, signed the consent form and returned these documents to the school. The children's teachers completed the teacher SDQ in the fourth term of a four-term school year so teachers had time to become familiar with the children. The project received ethical approval from the Psychology Research and Ethics Committee of the University of Waikato (Approval #14:62).

Data Analysis

SDQ data were coded in Excel® according to instructions provided on the SDQ website http://www.sdqinfo.org/py/sdqinfo/c0.py. Statistical analyses were conducted in SPSS 21®. All scale scores were transformed by taking the square root of every value in order to facilitate the use of parametric tests, but untransformed data are shown in all figures. In all cases, higher numbers represent theoretically higher presence of the problem or strength measured by each scale. For example, higher total difficulty scores represent a greater presence of difficulties for the child.

Results

We ran a factorial multivariate analysis of variance (MANOVA), using gender as a between-subject independent variable and informant version as a repeated-measures independent variable for the three dependent measures of Total Difficulty (TD), Externalising (EXT), and Internalising (INT) scores. Using Pillai's trace, we found a significant effect of informant version on scores ($V = 0.93$, $F(6, 65) = 10.12$, $p < .001$). For all three measures (TD, EXT, and INT scores), scores differed significantly by informant (TD: $F(1.68, 117.86) = 34.73$, $p < .001$, $d = .70$; EXT: $F(1.71, 119.78) = 26.01$, $p < .001$, $d = .61$; INT: $F(1.65, 115.23) = 18.35$, $p < .001$, $d = .51$)[1] , with the lowest scores given by teachers, and the highest by students, as shown in Figure 1. For all three measures, Bonferroni post-hoc tests showed that teacher scores were significantly different from both parent and student scores ($p < .001$). Parent scores differed from student scores for TD ($p < .05$) but not for EXT ($p = .41$) or INT ($p = .23$) scores.

Figure 1 shows TD, EXT, and INT scores for male and female students for the three informants. According to the MANOVA, there was no significant main effect of gender on scores ($V = 0.06$, $F(3, 68) = 1.31$, $p = .28$), but there was a significant interaction between gender and informant version ($V = 0.24$, $F(6, 65) = 3.49$, $p = .005$). Univariate ANOVA revealed significant interactions between gender and informant version for TD ($F(1.68, 117.86) = 8.25$, $p = .001$, $d = .34$) and EXT scores ($F(1.71, 119.78) = 11.82$, $p < .001$, $d = .41$) but not for INT scores ($F(1.65, 115.23) = 1.04$, $p = .34$, $d = .12$). However, while statistical power was high (>.9) for all other tests, for the interaction effect of informant version and gender for INT scores, power was only .37, which may indicate that there is a real interaction that was undetected in this instance due to low statistical power.

Figure 1 shows that teacher versions resulted in higher TD and EXT scores for male compared to female students, but there was little difference between the TD and EXT scores of boys and girls according to parents or according to the students themselves. The mean INT scores for female and male students were more similar across the three informant versions than were TD and EXT scores. Correlations between TD scores for different informants were all significant, with the strongest positive correlation being between parents and students ($r(71) = .67$, $rs(71) = .62$, $p < .001$), followed by parents and teachers ($r(71) = .41$, $rs(71) = .44$, $p < .001$), with the weakest correlation between teacher and student versions ($r(71) = .28$, $p = .02$; $rs(71) = .30$, $p = .01$).

Figure 2 shows mean scores on the subscales of emotional symptoms, conduct problems, hyperactivity, and peer problems for boys (filled circles) and girls (empty circles) according to the three informants. In all cases, the students rated themselves as having higher levels of problems than parents, who, in turn, rated the students as having more problems than teachers did. For emotional symptoms, hyperactivity, and conduct, the teacher versions resulted in higher scores for boys compared to girls, but parent and student versions produced similar scores for boys and girls. Mean scores for peer problems did not differ much according to gender. Mean prosocial scores (not shown here) were high (>8 of a possible 10) for both genders for all informants.

Discussion

If TD score were to be used to identify children at risk, somewhere between 2.7 and 5.5% of children would be identified as at risk in our sample, depending on which informant version was used. These prevalence rates are similar to those found for a sample of British children aged between 11-16 years old (Goodman et al, 1998) and a sample of New Zealand 13 – 17 year olds (Black, Pulford, Christie, & Wheeler, 2010), but lower than rates found by other researchers (e.g. Johnson et al., 2014; Mellor, 2005), and lower than the 9.3% prevalence of student-informant abnormal total difficulties scores reported for a sample of New Zealand secondary school students in 2012 (Fleming et al., 2014).

Achenbach, McConaughy, and Howell (1987), in a meta-analysis of 119 studies, found the average correlation between parent and teacher ratings of child and adolescent problems to be 0.27, between parent and child to be 0.25, and between teacher and child, 0.20. In our

1 Note that because the assumption of sphericity was violated for informant version, and the Greenhouse-Geisser estimate was greater than .75, the Huynh-Feldt correction was used to adjust the degrees of freedom (Huynh & Feldt, 1976).

Figure 1. Mean Total Difficulty, externalising, and internalising scores for male and female students for each of three informants; teachers, parents, and students. Error bars represent the standard error of the mean.

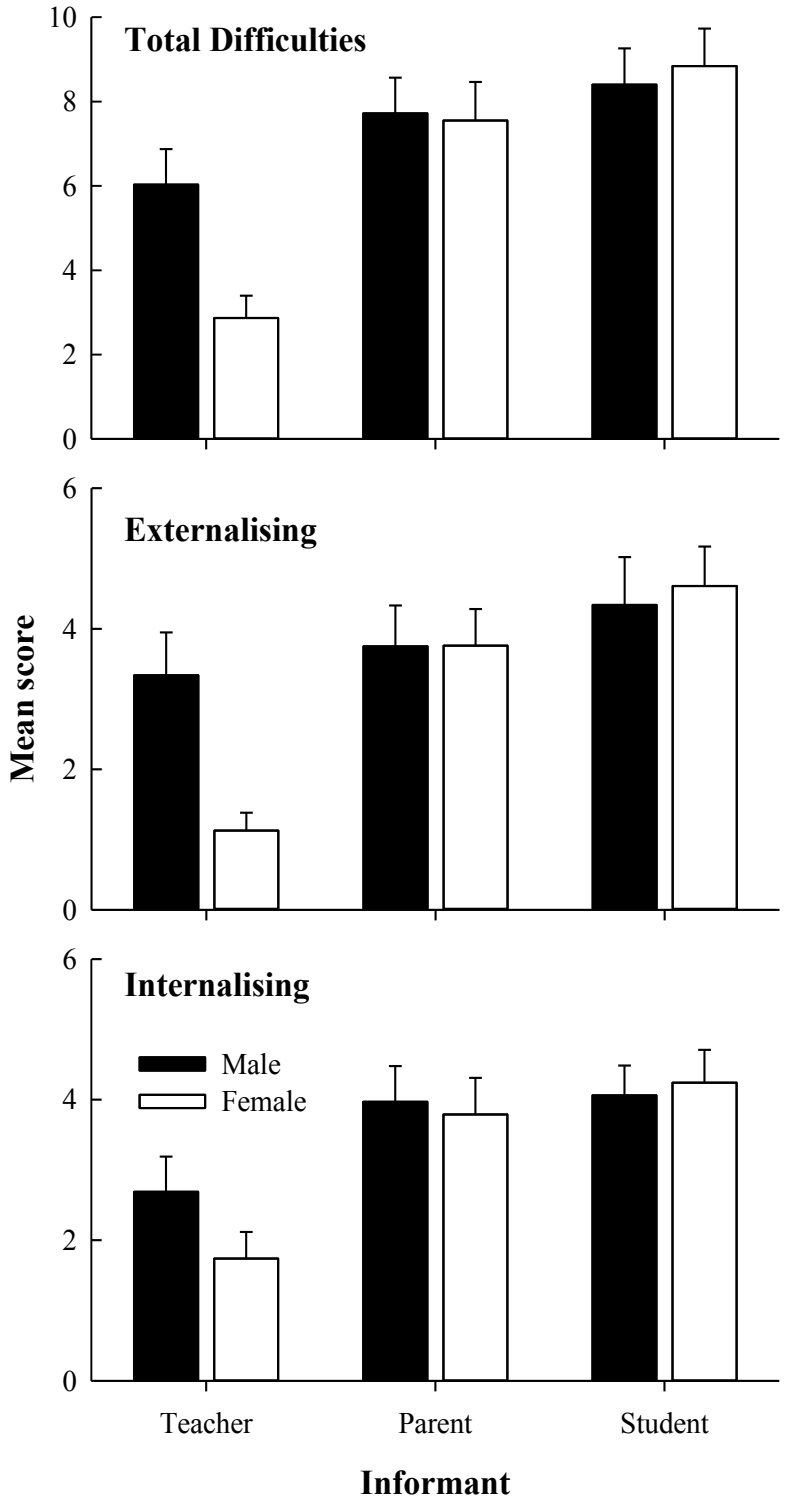
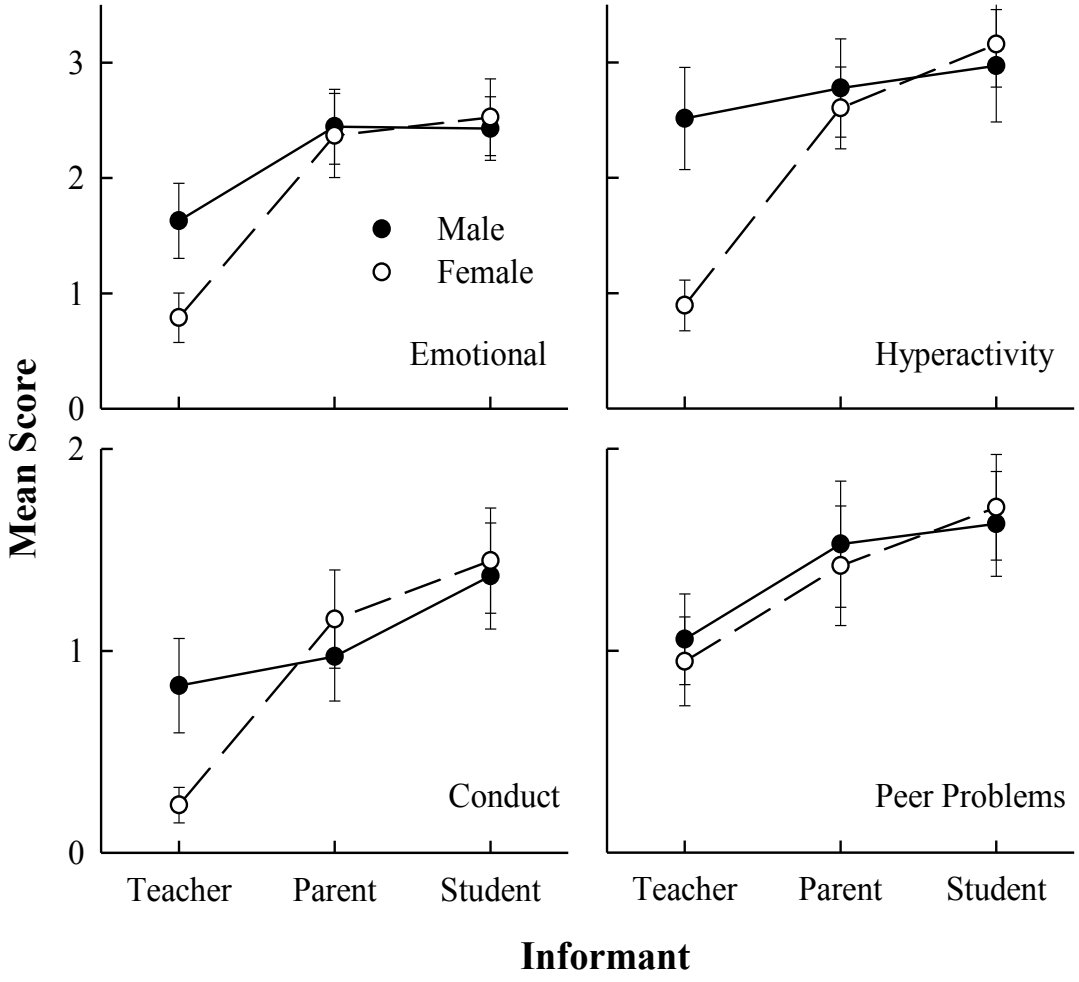


Figure 2. Mean scores on the emotional symptom, conduct problems, hyperactivity, and peer problem subscales for boys (filled circles) and girls (empty circles) by informant. Error bars represent the standard error of the mean. (Note that the y-axis scale for the top two graphs differs from that of the bottom two.)



sample, the correlation between parent and student total difficulty scores was much stronger than these averages. The correlation between teacher and parent was weaker, with the weakest correlation between teacher and student ratings. These findings, and those of Goodman et al. (1998) suggest that, if teacher ratings are being gathered, it is useful to include either a student or parent version, as these informants are supplying different information.

Dirks, Boyle, and Georgiades (2011) have suggested that, while parent and teacher ratings are based on different samples of behaviour, that is, behaviour differs at school and at home, other factors will influence the difference between parent and teacher ratings. For example, while parents spend extended periods with their children and with few other children, teachers spend less time with a larger number of children, so may be better placed to compare a child's behaviour with that of other children. Thus, for teachers, a child's behaviour needs to be more severe to be noticed, and may, therefore, be a stronger predictor of later problems. If this is case, then there is more to be gained from collecting two disparate assessments (teacher and parent, or teacher and student), than by obtaining two contextually similar assessments (parent and student). The research findings of Ferdinand, van der Ende, and Verhulst (2007) support this position, as they found that while parents were better predictors of poor outcomes for children than teachers, the predictions were improved by adding teacher-provided information. Goodman et al. (2004) recommend that if two informant versions of the SDQ are to be used, then the best combination is teacher and parent. Omitting the student version, they say, results in missing some children with emotional disorders.

The level of difficulties reported for the students in our sample, however, were highest when reported by students themselves. These findings were similar to those of several studies (e.g. Borg, Kaukonen, Joukamaa, & Tamminen, 2014; Capron et al., 2007; Johnson et al., 2014; Mellor, 2005; Sawyer, Baghurst, & Mathias, 1992), and seem to suggest that self-report SDQ results are not subject to social desirability biases, as suggested by Rønning et al. (2004). Conversely, Becker, Hagenberg, et al. (2004) found that the total difficulties scores of children from a German clinical sample were lower than the scores provided by their parents, and very similar to the scores provided by their teachers. De Los Reyes and Kazdin (2005), in a review of research on child assessment, note that informant disagreement is common and that little is known about why informant ratings are discrepant. Discrepant ratings may not indicate that one or more informant is unreliable, but that children's behaviour differs by context (Achenbach et al., 1987), as found by De Los Reyes, Henry, Tolan, and Wakschlag (2009) with preschool children. Indeed, Ferdinand, van der Ende, and Verhulst (2004) found that disagreements between parent and adolescent ratings of behaviour can even predict outcomes for those adolescents four years later. For example, Ferdinand et al. (2004) found that adolescents who rated themselves much higher for the presence of attention problems than their parents were much more likely to have been referred to mental health services in the four years following the measurement. Agreement between teacher and parent ratings is higher for younger children (under 12 years) than for adolescents, possibly because the behaviour of younger children is more consistent across different contexts (De Los Reyes & Kazdin, 2005), suggesting that multi-informant versions become more important with advancing age.

Figures 1 and 2 show that when the SDQ was completed by teachers, boys' scores were higher than girls', but that there was no difference between boys and girls when the SDQ was completed by parents or students. Researchers have shown a tendency for teachers (and sometimes parents) to report higher levels of externalising difficulties for boys than for girls (e.g. Capron et al., 2007; Graves, Blake, & Kim, 2012; Sawyer et al., 1992; Woerner et al., 2004). Soles, Bloom, Heath, and Karagiannakis (2008) also reported that teachers nominate more boys than girls for referrals and that those referrals are based largely on externalising problems. Given that our parents and students did not appear to detect a lower rate of externalising problems for girls, it is either the case that teachers do not notice the externalising problems of girls, or, more probably, that girls exhibit externalising behaviours to a greater extent outside of the classroom environment, and that these behaviours are not exhibited in the presence of teachers. Interestingly, Davé, Nazareth, Senior, and Sherr (2008) found that fathers report higher levels of externalising behaviours for their preschool boys than for girls but the ratings of mothers of the same children did not differ by gender. The authors suggest that fathers may be more susceptible to gender stereotyped expectations of their children's behaviour than are mothers, but it could also be the case that girls exhibit fewer externalising behaviours in the presence of their fathers than in the presence of their mothers. Whatever the reason for the difference in perception of difficulties of boys and girls, it seems important to collect student responses to the SDQ, as students may be more aware of their behaviour in multiple contexts. Additionally, given that any screening process should be child-focused, it is respectful to the young person to include their perception of themselves and their problems. More research into the behaviour of girls and boys in different contexts would help to identify which context is most predictive of future problems for young people, and would contribute to understanding whether and why children behave differently in different contexts (Graves et al., 2012).

Conclusion

We welcomed the opportunity provided by the Ministry of Education, the Ministry of Social Development, and a Social Sector Trial to assess the performance of the SDQ with a local sample. Our investigation suggests that it would be more efficacious to use two informant versions of the SDQ, rather than a single version to identify children at risk from psychological problems. For ease of administration, and to gather the two most disparate perspectives of behaviour, we recommend administering both the teacher and self-report (student) versions of the SDQ. As well, asking young people how they view their circumstances is respectful of them. Our results suggest that reliance on

teacher referral of children seems likely to result in a lower rate of referral of girls. Whether or not a lower referral rate is problematic for girls, and whether girls' behaviour varies more by context than does boys' behaviour, remains a topic for future research.

It may be helpful to discuss more generally the place of systematic screening in the context of the Vulnerable Children's initiatives (New Zealand Government, n. d.; New Zealand Government, 2012), to which our Social Sector Trial relates. A major advance of Children's Teams is that there are to be structures and processes for the sharing of information concerning young people and families experiencing difficulties across professionals and agencies. However, Children's Teams are dependent on intake processes to obtain clients (Children's Action Plan, 2014), and service delivery systems that are dependent on intakes are beset by an array of conceptual, logistical, and procedural challenges (Stanley & Sargisson, 2012, provide a summary of these issues). Most importantly, in some situations it is unlikely that servicing based on intake approaches can respond to the size and seriousness of the problems that they are expected to address. For instance, Growing Up in New Zealand researchers have found that only one fifth of families whose children are especially likely to be vulnerable to health and behavioural problems had received assistance during their first 100 days of life from social support services (Growing Up in New Zealand News, 2015). Furthermore, other experience in longitudinal human development research, both here and overseas, makes plain how difficult it is to obtain, and to retain, the most at-risk participants in an investigation (Schoon, 2006; Stanley, 2010).

Such potential concerns about the prevalence, and the severity, of difficulties amongst school-aged children can only be addressed by systematic screening; and when these data are available it is then possible to make rational decisions about the deployment of staff and the utilisation of other resources. Nevertheless, there is a recurring worry that screening produces false positives and that children will be stigmatised. Kauffman and Landrum (2013) argue, however, that the real problem is false negatives (which occur more often). We know that young people with difficulties who are not identified can go on to be problems to themselves and others throughout much of their lives, and we also have available evidence-based programmes such as the Incredible Years series (http://www.incredibleyears.com) that can regularly realign maladaptive developmental trajectories when implemented with fidelity. In addition, screening devices like the SDQ assess children's personal assets, as well as the presence of challenges, and any further determination of the need for assistance should always be reliant on professional assessment and judgment as currently occurs.

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Employee resilience and leadership styles: The moderating role of proactive personality and optimism

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Resilience has merited growing interest in psychology and management research, given its potential to drive important organisational outcomes. Yet, there is limited understanding of the individual and contextual factors that promote resilient behaviours in organisations. This study explored relationships between dispositional variables (proactive personality and optimism), leadership styles (empowering and contingent reward leadership) and employee resilience. Data were collected from a sample of 269 while-collar workers in New Zealand through an online survey. Results show that empowering leadership, proactive personality and optimism were significantly related to resilient behaviours. Moreover, optimism interacted with contingent reward leadership to predict employee resilience. The findings underscore the importance of measuring employee resilience as a contextualised, behavioural capability, and the need to investigate its nomological network considering the interplay of organisational enablers and dispositional variables.

Keywords: Leadership, employee resilience, proactive personality, optimism

Organisations operate in an increasingly competitive and dynamic context, and their success is a reflection not only of their capacity to survive, but also of their ability to continually adapt in challenging environments (Lampel, Bhalla, & Jha, 2014; Lengnick-Hall & Beck, 2011). Growing evidence that resilient organisations are better able to recover from and even thrive following major crises has placed organisational resilience research in the limelight over the past decade (Fleming, 2012; Lampel et al., 2014; Linnenluecke, 2015). There is general consensus in recent scholarship with regards to the critical contribution of resilient employees to the organisation's capacity to engage in ongoing development, to survive major crises, and to thrive under uncertain circumstances (Carvalho & Areal, 2015; Southwick, Bonnano, Masten, Panter-Brick, & Yehuda, 2014; Van der Vegt, Essens, Wahlstrom, & George, 2015). This underscores the importance of contextualising employee resilience in occupational settings, and framing it as a capability that can be developed over time and as a function of person-organisation exchanges (Robertson, Cooper, Sarkar, & Curran, 2015; Shaw, McLean, Taylor, & Swartout, 2016). Though a behavioural, contextualised approach to individual resilience has been advocated in review papers (e.g., Fletcher & Sarkar, 2013, Robertson et al., 2015), empirical research to date has largely measured resilience as a trait or a coping mechanism (Luthans & Church, 2002). Consequently, studies have thus far conceptualised employee resilience as an individual resource developed and manifested in response to adversity, rather than as a dynamic capability that signals and ensures innovation and preparedness for future crises (Linnenluecke, 2015). To address this gap, the present study adopts a behavioural and workplace-specific approach to employee resilience, which comprises a suite of learning-oriented and relationship-building workplace behaviours, supported by the organisation, that enhance organisational functioning (Näswall, Kuntz, Hodliffe & Malinen, 2015). Based on previous research suggesting that an organisation's capacity to build and maintain resilience capability among its employees is contingent upon its management of resilience-enabling practices and procedures (Bardoel, Pettit, De Cieri, & McMillan, 2014; Lengnick-Hall & Beck, 2011; Shin, Taylor, & Seo, 2012), and that specific individual differences may account for greater likelihood that people exhibit adaptive and learning-oriented behaviours (Sarkar & Fletcher, 2014; Thompson, 2005), we contend that resilient behaviours represent the upshot of both intrapersonal factors, and the availability of enabling organisational factors, including leadership.

The purpose of this study is twofold. First, it tests the unique effects of dispositional variables typically associated with resilience (i.e., proactive personality and optimism) and of enabling leadership styles (i.e., empowering and contingent reward leadership) on the degree to which employees enact resilient behaviours. Second, the study examines whether and how individual differences and perceived style of the leader interact and relate to employee resilience.

Employee Resilience

Individual resilience has largely been operationalised as a dispositional variable responsible for the psychological mechanisms that enable people to bounce back following crises or traumatic events (Bonanno, 2004; Shin et al., 2012; King & Rothstein, 2010; McLarnon & Rothstein, 2013; Moenkemeyer, Hoegl, & Weiss, 2012; Pipe et al., 2012; Youssef & Luthans, 2007). Although in recent years the individual resilience research has expanded its scope from clinical and developmental foci to applications in occupational settings (Avey, Luthans, & Jensen, 2009; King & Rothstein, 2010; Lee, Sudom, & McCreary, 2011; Lengnick-Hall & Beck, 2011; Luthans, 2002), an overview of the recent literature reveals disparate conceptual and operational perspectives of the construct (Linnenluecke, 2015). The extant individual resilience literature largely

portrays the construct as a relatively stable disposition, related to self-efficacy, locus of control, and agreeableness (Lee et al., 2011; Wagnild & Young, 1993). Recent works have departed from that dispositional approach, and suggest that resilience comprises a more fruitful construct in organisational research if conceptualised as an individual capability that can be developed though interactions between people and their environment (Fletcher & Sarkar, 2013; Lengnick-Hall et al., 2011; Luthans & Avolio, 2003). Despite this, the existing resilience measures appear to lag behind theoretical developments, and fail to capture the dynamic capability elements of the construct (McLarnon & Rothstein, 2013). One notable exception can be found in Kuntz, Naswall & Malinen (2016), who define employee resilience as "the capacity of employees, facilitated and supported by the organisation, to utilise resources to positively cope, adapt and thrive in response to changing work circumstances" (p. 3). Their approach to employee resilience is predicated on three core assumptions: (1) employee resilience is partly the upshot of, but operationally distinct from the dispositional factors that promote individual resilience, (2) employee resilience is a behaviour-based construct comprised of three underlying facets (learning, adaptability, and networking), and (3) resilient behaviours can be developed and sustained if the appropriate organisational systems are in place. Regarding the latter, recent research suggests that leadership represents a critical enabler of resilience development in organisations (Nilakant et al., 2016) and will therefore be selected as a focal variable in the present paper.

Leadership and Employee Resilience

While a number of organisational features have been advanced as enablers of resilience development, namely leadership behaviours aimed at clarifying goals and expectations, fostering employee growth and participation, and providing support for work and non-work demands, there is limited empirical evidence to substantiate these assertions (Bardoel et al., 2014; Harland et al., 2004; King & Rothstein, 2010; Luthans & Avolio, 2003). Empowering leadership behaviours have enjoyed growing research interest over the past decade due to their associations with change-related outcomes (Ahearne, Mathieu, & Rapp, 2005; Pearce & Sims, 2002). Empowering leaders develop subordinates' self-management skills through delegation of authority, participative decision-making, ensuring meaningful work, conveying confidence in subordinates' capacity to achieve results, and personal support (Ahearne et al., 2005; Dierendonck & Dijkstra, 2012; Mills & Ungson, 2003; Scott, Hui, & Elizabeth, 2013; Seibert, Wang, & Courtright, 2011). Empowering leadership behaviours target employee involvement with the organisation, skill development, autonomy, and encouragement of stretch goals, which map on the underlying facets of employee resilience (i.e., learning, adaptability, and networking). It is therefore expected that empowering leadership be positively associated with employee resilience.

H1: Empowering leadership will be positively associated with employee resilience

Defined as the "degree to which a leader administers positive reinforcers, such as recognition, acknowledgement, and commendations, contingent upon high performance" (p. 813) (Podsakoff, Todor, & Skov, 1982), contingent reward leadership consists of recognising effort, goals and milestone achievements (Camps & Torres, 2011). Although contingent reward leadership is often associated with the notion of inducements for contributions that characterises the transactional leadership framework, and typically considered less effective in relation to transformational leader behaviours (Bass, Avolio, Jung, & Berson, 2003; Breevaart et al., 2014; Epitropaki & Martin, 2005), research has uncovered positive links between contingent reward leadership and job performance, satisfaction, and approach-coping resilience (Harland et al., 2004; Podsakoff et al., 1982). Regarding the latter, the feedback component of recognition for effort and achievement may be the point where contingent reward leadership and resilient behaviours intersect. The timely recognition of effort and achievements provide employees with clear feedback on their performance, both throughout the task and after its completion. Clear feedback enhances employees' awareness of their performance level, clarifies developmental needs (London, Larsen, & Thisted, 1999), and increases their motivation to set and achieve challenging goals, and to adjust their effort as needed. Leadership behaviours aimed at reinforcing high performance and goal achievement map on the learning facet of employee resilience, which involves feedback-seeking behaviours, learning from mistakes and continually re-evaluating performance (Näswall et al., 2015). Hence, contingent reward leadership is expected to positively relate to employee resilience.

H2: Contingent rewards leadership will be positively associated with employee resilience

Individual Differences and Employee Resilience

The extant research offers ample evidence for the relationship between resilience and individual differences, including optimism, self-efficacy, and proactive personality (e.g., Mache, Vitzthum, Wanke, Groneberg, Klapp, & Danzer, 2014; Sarkar & Fletcher, 2014; Segovia, Moore, Linnville, Hoyt, & Hain, 2012; Smith, Tooley, Christopher, & Kay, 2010; Tugade, Fredrickson, & Barrett, 2004). However, the studies listed, even the ones conducted in occupational contexts, regard resilience a psychological coping mechanism, inviting further research into the potential for individual differences to drive resilient behaviours. Optimism is defined as a "generalised tendency to expect positive outcomes" (p. 220) (Scheier & Carver, 1985). Optimistic individuals tend to more accurately identify causes of, and correctly ascribe responsibility for, task success and failure (Seligman & Csikszentmihalyi, 2000). We argue that the capacity to accurately evaluate process and outcome performance issues that characterises optimistic individuals will likely drive resilient behaviours, namely the utilisation of error as springboard for learning and for fine-tuning performance. Empirical research linking optimism to commitment to change, ability to cope with changing work environments and positive workplace behaviours (Kool & Dierendonck, 2012; Youssef & Luthans, 2007) further suggests that higher levels

of optimism may be related to resilient behaviours, which encompass change adaptability. Hence, the following is hypothesized:

H3: Optimism will be positively associated with employee resilience

The link between proactive personality and resilience has merited far less attention and, not surprisingly given the dominant trait-based perspective of individual resilience, this personality trait has been viewed as comprising a higher-order resilience construct (Sarkar & Fletcher, 2014). In organisations, proactive personality disposes individuals to change-oriented behaviours, and has been positively related to initiative in career management, seeking support from others at work, and leveraging workplace resources (Ashford & Black, 1996; Seibert, Crant, & Kraimer, 1999; Thompson, 2005). As the capacity to utilise resources from the organisation is integral to the employee resilience construct adopted in this study (Näswall et al., 2015), we expect that proactive personality will be positively related to resilient employee behaviours.

H4: Proactive personality will be positively associated with employee resilience

The impact of leadership styles on employee outcomes has been extensively researched, both in relation to direct effects, and considering the moderating role of individual differences (e.g., Ehrhart & Klein, 2001; Epitropaki & Martin, 2005; Harland, Harrison, Jones, & Reiter-Palmon, 2004; Hetland, Sandal, & Johnsen, 2008; Woolley, Caza, & Levy, 2011; Zhu, Avolio, & Walumbwa, 2009). For instance, employees who exhibit high self-esteem, achievement orientation and risk-taking propensity tend to respond to leaders' transformational behaviours with high performance (Ehrhart & Klein, 2001). Further, Big Five personality traits and learning orientation have shown to moderate the effect of transformational leadership behaviours on employee performance and engagement (Chi & Ho, 2014; Zhu et al., Avolio, & Walumbwa, 2009). Considering the evidence outlined, while we posit that resilient behaviours can be fostered directly through enabling leadership behaviours, it is also plausible that the extent to and manner in which leader behaviours influence employee resilience is affected by dispositional factors. With regards to empowering leadership, employees higher in the proactive trait may be more motivated to behave in ways that reflect empowering leadership aims (e.g., self-manage and take initiative at work), and more disposed to, and capable of, taking advantage of the resources offered by leaders. Therefore, the following is hypothesized:

H5: Empowering leadership will be more strongly related to resilient behaviours at higher levels of proactive personality

Given that contingent rewards leadership is characterised by acknowledgement of desirable behaviours and performance achievements, we suggest that individuals with high proactive trait – disposed to self-initiating action guided by environmental cues – will exhibit more frequent resilient behaviours when this leadership style is utilised. Finally, we propose that praise for achievement and timely provision of performance feedback through recognition interact with high scores in optimism (associated with tendency for performance re-evaluation and error utilisation behaviours) and are associated to higher levels of employee resilience.

H6: Contingent rewards leadership will be more strongly related to resilient behaviours at higher levels of proactive personality

H7: Contingent rewards leadership will be more strongly related to resilient behaviours at higher levels of optimism

Method

Participants and Procedure

The sample for this study was comprised of 269 white-collar workers representing several industries, predominantly finance, healthcare and education. These participants were recruited through an invitation distributed to professional networks, including Human Resources Institute of New Zealand (HRINZ) and LinkedIn. The invitation contained a link to an online survey. Of the 269 professionals who completed the survey, 61.5% were female and 85.1% worked full-time. The mean age was 42 years (SD = 11.93), mean tenure 6.71 years (SD = 7.73), and mean length of working with their immediate supervisor was 3.18 years (SD = 3.78). The study was reviewed and approved by a Human Research Ethics Committee.

Measures

An online questionnaire was used in this study to cover the five variables of interest. All items were rated on a 5-point Likert scale. For employee resilience, the ratings ranged from 1 (*almost never*) to 5 (*almost always*). For the remaining scales, ratings ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

Employee resilience

Employee resilience was measured with the nine-item EmpRes scale developed by Näswall et al. (2015). Examples include "*I effectively collaborate with others to handle challenges at work*" and "*I learn from mistakes at work and improve the way I do my job*", where higher scores reflect higher employee resilience ($\alpha = .86$)

Empowering leadership

The ten-item Leadership Empowerment Behaviours scale (Ahearne et al., 2005) was used in the present study ($\alpha = .88$). The measure covers employee views regarding the extent to which their leader engages in four empowering behaviours: enhancing the meaningfulness of work, fostering participation in decision-making, expressing confidence in high performance, and providing autonomy from bureaucratic constraints (pp. 949). Examples of the items include "*My supervisor often consults me on strategic decisions*" and "*My supervisor believes in my ability to improve even when I make mistakes*".

Contingent reward leadership

The leader's contingent reward behaviours scale by Podsakoff et al. (1982) was used. This scale assesses employee perceptions of the extent to which a leader positively reinforces performance through recognition. Examples of the items are: "*My supervisor gives me special recognition when my work performance is especially good*" and "*My supervisor commends me when I do a better than average job*" ($\alpha = .93$).

Proactive personality

This dispositional variable was

measured using the ten-item Proactive Personality scale developed by Seibert et al. (1999) (α = .86). Examples of this scale include: "*I excel at identifying opportunities*" and "*Wherever I have been, I have been a powerful force for constructive change*".

Optimism

Optimism was measured with the revised Life Orientation Test (Scheier, Carver, & Bridges, 1994). Some examples are "*In uncertain times, I usually expect the best*" and "*I'm always optimistic about my future*". Higher ratings reflect higher levels of optimism (α = .70).

Results

Table 1 illustrates descriptive statistics, bivariate correlations, and reliability estimate (italicized) for each scale. Overall, all scales showed adequate reliability estimates in this study, with coefficients ranging from .72 to .94. Employee resilience was positively and significantly associated with the leadership styles and dispositional variables investigated. While the correlations between predictors and outcomes did not exceed .37, it should be noted that the correlations between the two leadership styles was .69. An exploratory factor analysis (principal axis factoring, direct oblimin rotation) was conducted to ascertain whether these leadership scales represent distinct variables. The 2-factor solution obtained and the correlation between factors (.58) supported the consideration of separate leadership styles. A discriminant validity test was also conducted to assess whether employee resilience is empirically distinct from personality traits to which the construct has previously been associated (Avey et al., 2009). Results from factor analysis revealed that the items used to measure employee resilience, optimism and proactive personality load onto separate factors, consistent with their respective scales, which suggests that employee resilience is operationally distinct from the personality traits assessed in this study.

Table 1. *Means, Standard Deviations, Correlations, and Coefficient Alphas (Diagonal)*

	M	*SD*	1	2	4	5	6
1. Empowering Leadership	3.62	.63	*(.88)*				
2. Contingent Reward Leadership	3.37	.83	.69**	*(.94)*			
3. Proactive Personality	3.65	.54	.09	-.05	*(.87)*		
4. Optimism	3.52	.63	.33**	.17**	.43**	*(.79)*	
5. Employee Resilience	4.03	.40	.37**	.24**	.29**	.35**	*(.72)*

Note: *n*=269; ** *p*< .01

Moderated Multiple Regression

Moderated multiple regression analyses were performed to examine main effects and potential interactions between leadership styles, proactive personality and optimism. Collinearity statistics were computed and tolerance values for all variables ranged from .49 to .92, above .10, suggesting no notable issue with multicollinearity (Hair, 1998; Tabachnick & Fidell, 2013). The predictor variables were centred prior to conducting regression analyses. Results of regression analyses are depicted in Table 2. In the first model, the total variance in employee resilience explained by leadership styles was 14%, with empowering leadership accounting for the significant variance in this outcome ($F(1,266) = 20.10$, $p < .01$). These findings indicate that empowering leader behaviours and dispositional variables contribute uniquely to employee resilience

The third model included the interaction terms contingent rewards x proactive personality, contingent rewards x optimism, and empowering leadership x proactive personality proposed. The inclusion of these interaction terms explained an additional 3% of the variance in employee resilience ($F(3, 260) = 2.58$, $p < .05$). There was a significant interaction effect between contingent rewards leadership and optimism (*β*=-.16, $p < .01$). As depicted in Figure 1, at low levels of contingent reward leadership, employees with high optimism scores exhibited significantly greater resilience

Table 2. *Regression Analyses (DV: Employee Resilience)*

	Employee Resilience *β*
Model 1	
Contingent Reward Leadership (CR)	-.02
Empowering Leadership (EL)	.39**
ΔR^2	.14**
Model 2	
Contingent Reward Leadership (CR)	.06
Empowering Leadership (EL)	.25**
Proactive Personality	.25**
Optimism	.19**
ΔR^2	.13**
Model 3	
Contingent Reward Leadership (CR)	.05
Empowering Leadership (EL)	.22**
Proactive Personality	.25**
Optimism	.19**
CR*Proactive	.15†
CR*Optimism	-.16**
EL*Proactive	.05
ΔR^2	.03*
Total R^2	.30**

Note. *n*=269. † *p*<.10, * *p*<.05, ** *p*<.01.

than individuals with low optimism scores. This suggests that although contingent reward leadership behaviours do not enhance employee resilience for optimistic individuals, optimism may serve as a protective factor when leaders fail to recognise performance and effort. While non-significant at the $p < .05$ cut-off, the interaction effect between contingent rewards leadership and proactive personality is also noteworthy considering a less stringent cut-off (β=.15, p= .09). At high levels of perceived contingent reward leadership, employees with higher proactive personality scores displayed greater resilience than employees with lower proactive personality scores. These results are consistent with the expected relationship: when leaders provide feedback on performance and other desirable behaviours in the form of recognition, employees with higher proactive personality will feel encouraged to engage in the exploratory learning and performance re-evaluation behaviours consistent with this trait.

Discussion

The present study proposed to uncover the relationships between leadership styles (empowering and contingent reward leadership), dispositional variables (proactive personality and optimism) and resilient employee behaviours. Importantly, this study addressed recent calls for departure from a dispositional perspective of resilience in occupational settings (e.g., King & Rothstein, 2010), and adopted a behaviour-based framework to empirically test the role of leadership style and personality factors associated with dispositional resilience on resilient employee behaviours. The results indicate that employee resilience is related to, but operationally distinct from, dispositional variables typically associated with the resilience construct (i.e., proactive personality and optimism) (Alvord & Grados, 2005; Avey et al., 2009). Further, the findings suggest that resilient employee behaviours were significantly related to leadership behaviours. Given the well-established relationships between empowering leadership and readiness for change (Ahearne et al., 2005; Pearce & Sims, 2002), it was not surprising that leadership behaviours aimed at fostering self-management skills and supporting staff with new challenges at work emerged as a key predictor of resilient behaviours (Fleming, 2012; Luthans, 2002; Seville et al., 2006).

Despite the significant correlation between contingent reward leadership employee resilience, this leadership style did not significantly predict resilience when empowering leadership was added to the regression model. The suppression effect of empowering leadership on contingent rewards leadership can be explained by some practical similarities between the two styles. Clarification of goals and performance expectations through recognition comprise important feedback behaviours that promote intrinsic motivation and facilitate continuous learning and adaptive capacity (Cameron, Pierce, Banko, & Gear, 2005; Heerey, 2014; Näswall et al., 2015). While the utilisation of recognition behaviours as a feedback tool signifies a contingent leadership approach, these behaviours can be subsumed, implicitly and explicitly, by the empowering leadership framework utilised in this study. The items used to assess empowering leadership covered clarification of work goals and of the links between these goals and organisational direction, expressions of belief in employee competence, and management of day-to-day operations to facilitate employee performance. This may have accounted for the suppression effect, and underscores the need to ensure items within leadership style measures are sufficiently distinct to operationally discriminate between leadership approaches.

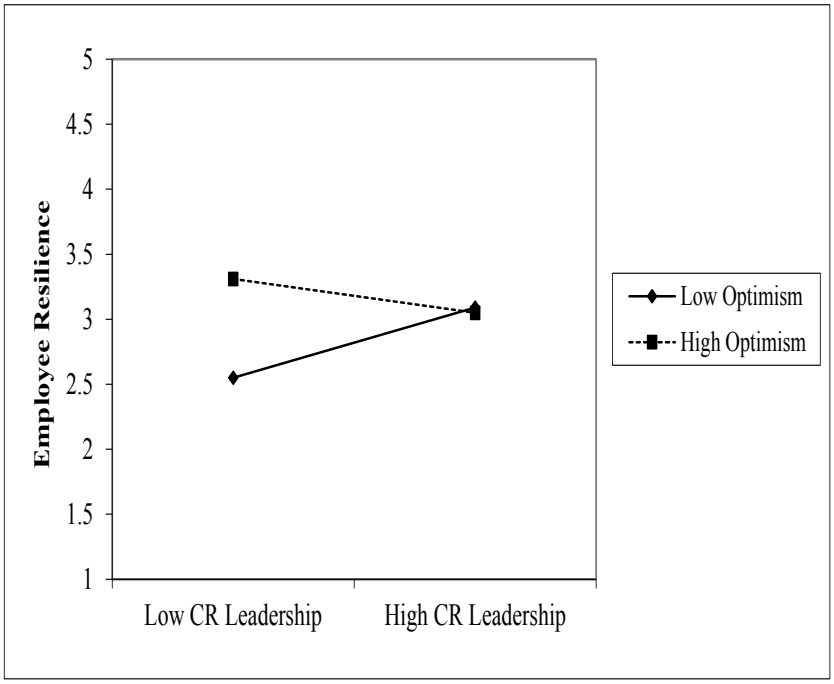

Figure 1: *Interaction of contingent reward leadership and optimism in predicting employee resilience.*

Proactive personality emerged as a significant predictor of employee resilience. This finding are consistent with previous research suggesting a positive relationship between proactive personality, and network-building and feedback-seeking behaviours (Chiaburu, Baker, & Pitariu, 2006; Thompson, 2005), both facets of the employee resilience construct considered in this study. Further, proactive personality has been associated with actively seeking for and identifying opportunities in times of change (Bateman & Crant, 1993), consistent with the adaptive facet of the construct. Optimism also contributed significantly to the prediction of resilient behaviours. Aligned with previous research linking optimism with an adaptive stance and with resilience from a coping perspective (Kool & Dierendonck, 2012; Lee et al., 2011), optimistic employees enacted resilient behaviours more frequently.

With respect to interaction effects, the

regression findings support the assertion that the extent to which employees enact resilient behaviours is predicated on enabling factors, including leadership (Bardoel et al., 2014; Harland et al., 2004; King & Rothstein, 2010), but that in some instances individual differences influence this relationship. Empowering leadership accounted for significant variance in employee resilience beyond and independently from the effect of individual differences. However, the significant impact of contingent reward leadership on resilient behaviours depended upon optimism, where high levels of optimism seemed to compensate for low levels of leader recognition in relation to resilient behaviours.

Implications for Research and Practice

The present study contributes to the growing body of workplace resilience literature by empirically testing the unique contributions of dispositional variables and leadership styles to resilient employee behaviours. Clinical and developmental approaches to resilience have dominated the psychology literature (e.g. Alvord & Grados, 2005; Lee, Sudom, & Zamorski, 2013; Wagnild & Young, 1993), framing resilience as a dispositional variable linked to positive self-regulatory and coping functions (King & Rothstein, 2010; McLarnon & Rothstein, 2013; Moenkemeyer et al., 2012). Notwithstanding its dispositional foundations, we argue that a useful conceptualisation and operationalization of employee resilience should rely on a behavioural framework contextualised in an occupational setting. Assessing resilience as a developable employee capability allows practitioners to capitalise on resilient behaviours to enhance performance, identify areas of intervention to ensure alignment between organisational practices and systems (resilience enablers) and human capital, and foster a positive work environment where employees can learn and thrive.

Past research suggests that the development of resilience in the workplace is founded on a dynamic process wherein individual and contextual factors interact (Fletcher & Sarkar, 2013; King & Rothstein, 2010; Luthar, Cicchetti, & Becker, 2000; Moenkemeyer et al., 2012). The findings obtained in this study, highlighting the direct and moderated effects among leadership styles, dispositional variables and employee resilience, offer support for this assertion, and invite further research into additional organisational enablers, intrapersonal factors, and outcomes of resilient behaviours. Variables of interest for future studies include learning culture, wellbeing and regulatory focus (Nilakant et al., 2016). Individual resilience has been associated with positive workplace behaviours and attitudes such as commitment towards change, job satisfaction, engagement, reduced stress, and decision-making quality (Shin et al., 2012; Wanberg & Banas, 2000; Xing & Sun, 2013). Further empirical enquiry is needed to substantiate these linkages considering a contextualised, behavioural approach to employee resilience.

On a practical note, this study emphasises that the same leadership approach may result in disparate degrees of employee resilience, as a result of the interplay of leadership behaviours and individual differences. In addition to the consideration of dispositional variables in leaders' efforts to develop resilience capability, the present study also highlights the importance of providing autonomy (e.g. decision-making discretion), clear direction on performance, and feedback on achievements in the form of recognition (Ahearne et al., 2005). Understanding the unique and combined influence of leader behaviours and dispositional variables in the development of employee resilience will inform the development of workplace resilience training programmes (Bardoel et al., 2014; Kumar, Adhish, & Deoki, 2014; McElroy & Stark, 1992).

Limitations and Directions for Future Research

Despite its notable contributions to research and practice, the present study has several limitations. First, the cross-sectional design, where predictor and outcome data were collected simultaneously, render the findings susceptible to common method variance, and preclude any robust inferences with regards to the causality nexus (Spector, 1994). The relation between leadership styles and employee resilience is expected to change over time, and between leadership styles, suggesting the need to select longitudinal designs in future studies. Nevertheless, the cross-sectional design was suitable to a first attempt to explore individual and contextual predictors of resilient behaviours. The self-report nature of the study represents another limitation, where social desirability bias may have influenced the results obtained (Donaldson & Grant-Vallone, 2002; Spector, 1994). Social desirability refers to respondents' motivation to portray themselves and others (leaders) in a positive light (Donaldson & Grant-Vallone, 2002; Lievens, Geit, & Coetsier, 1997). Future research can mitigate this source of bias by collecting measures from multiple sources and examining agreement among raters (Lievens et al., 1997; Spector, 1994). Overall, we propose that further empirical enquiry is needed to test the proposed relationships within organisations and teams, considering the context in which they are embedded, to allow for an in-depth, culture-bound understanding of leader-employee dynamics in the development of resilience capability in both stable and uncertain times.

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Illness perceptions and treatment outcomes in Hepatitis C

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Objectives. Investigate the ability of illness perceptions to predict Hepatitis C (HCV) treatment outcomes, after first controlling for relevant HCV clinical and demographic data.

Method. Thirty two participants with HCV completed two online questionnaires at Time 1 (pre-HCV treatment) and Time 2 (three months post commencement of HCV treatment). Time 1 online survey collected HCV clinical and demographic data and measured the illness perceptions of participants. Based on the self-regulatory model of illness (SRM), the eight-component structure of the Brief Illness Perception Questionnaire (BIPQ) (Broadbent, Petrie, Main, & Weinman, 2006), which included illness consequences, timeline, personal and treatment control, illness identity, concern, coherence or understanding, emotional response, and causality, was utilised. Time 2 online survey assessed (1) HCV treatment adherence and (2) HCV treatment response.

Results. Treatment control perceptions emerged as the singular illness perception to predict HCV treatment outcome. The only HCV clinical data to contribute to variance in treatment outcome results were substance use and reported mental health comorbidity .

Conclusions. Results demonstrate the important role of illness perceptions in predicting HCV treatment outcomes, and provide support for including HCV pre-treatment psychological interventions to address maladaptive illness perceptions for individuals preparing for HCV treatment.

Hepatitis C (HCV) is a high prevalence blood borne disease, often chronic in nature that can potentially be associated with a number of physical comorbidities such as cirrhosis of the liver, hepatocellular carcinoma, musculoskeletal pain, and cognitive impairment (Barkhuizen et al., 1999; Chen & Morgan, 2006; Forton, Taylor-Robinson, & Thomas, 2003; Glacken, Coates, Kernohan, & Hegarty, 2003; Hoofnagle, 1997; Koziel, 2005; Lehman & Cheung, 2002; Mendez et al., 2001; Ramalho, 2003), and psychological comorbidities such as depression and anxiety (Chapko et al., 2005; Chen & Morgan, 2006; Fried et al., 2002; Hauser, Zimmer, Schiedermaier, & Grandt, 2004; Lee & Harrison, 2005; Shiffman et al., 2004; Simmonds, 2001). Despite the potential for individuals to clear HCV through anti-viral treatment regimens, variance in treatment outcomes remain, and unlike other types of Hepatitis, such as Hepatitis B (HBV), no vaccine currently exists to protect individuals from contracting HCV (Coppola et al., 2004; Shiffman et al., 2004).

Recent estimates suggest that approximately 170 million individuals have been infected with HCV worldwide (Lee & Abdo, 2003; Shiffman et al., 2004). Due to data collection limitations, the exact number of individuals infected with HCV in New Zealand remains unknown. Despite these limitations that are largely related to many cases of HCV remaining undiagnosed, it has been estimated that in New Zealand, approximately 54,000 individuals are currently living with HCV (Gane et al., 2014). This is compared to Australia, where it has been estimated that approximately 270,000 individuals are living with chronic cases of HCV (Gane et al., 2014). Further, estimates of HCV prevalence in New Zealand related to ethnicity have suggested that the vast majority of reported cases of HCV come from individuals from a European background (approximately 76%), compared to 15% of reported cases from within the Maori population, and 1% of reported cases coming from within the Pacific Islander population (New Zealand Health Information Service, 2001). By comparison, in Australia, estimates of HCV prevalence among individuals from an indigenous background have been problematic to determine due to a number of data collection limitations, including in many cases, the lack of a requirement to include reporting of ethnicity in many states and territories when reporting acute HCV infection (National Centre in HIV Epidemiology and Clinical Research, 2007).

At the time data were collected for the present study, the standard treatment protocol for HCV included interferon (once weekly self-administered intramuscular injection), ribavirin (daily oral self-administered medication), and depending on pre-treatment medical assessment results, an additional protease inhibitor drug (either boceprevir or telaprevir) (Jacobson et al., 2012; Shiffman et al., 2004; Thompson, 2016; Wackernah, Lou, & Park, 2011). Similar to ribarvirin, boceprevir and telaprevir require the individual to take an oral tablet on a daily basis for the required treatment period (Jacobson et al., 2012). Treatment periods for individuals undergoing interferon, ribavirin and protease inhibitor HCV treatment can be between 12 to 48 weeks depending on pre-treatment medical assessment results (e.g., cirrhosis of the liver typically requires longer treatment) (Jacobson et al., 2012; Wackernah et al., 2011). Further, for individuals preparing for interferon based HCV treatment, a comprehensive psychosocial assessment is often required, in addition to other pre-

treatment bio-medical assessments, to determine the individual's psychological preparedness for HCV treatment (Thompson, 2016). The rationale for the inclusion of pre-treatment psychosocial assessments is primarily due to the potential for interferon to exacerbate existing mental health conditions, cause endogenous depression, or in rare cases psychosis. (Holmes, Thompson, & Bell, 2013; Sarkar, Sarkar, Berg, & Schaefer, 2015; Wackernah et al., 2011).

More recently, a new interferon free generation of direct-acting anti-viral medications (eg., sofosbuvir, ledipasvir, and daclatasvir), with fewer reported side effect profiles and higher HCV clearance rates in comparison to interferon based treatment protocols has become available in Australia (Thompson, 2016). However, interferon based HCV treatment protocols remain the standard treatment for HCV in many countries across the world, including New Zealand (Gane et al., 2014; Wackernah et al., 2011). It is also important to note that in Australia, the newer generation direct-acting anti-viral medications are only currently funded under the national pharmaceutical benefits scheme (PBS), to treat individuals with HCV genotypes 1, 2 or 3 (Thompson, 2016). Individuals with HCV genotypes 4, 5, or 6 currently remain ineligible to receive subsidised treatment under the PBS for the newer direct-acting anti-viral medications and will need to continue to receive interferon based HCV treatments for the foreseeable future (Thompson, 2016). Similar inequities exist related to access to newer generation direct-acting anti-viral medications in other parts of the world largely based on treatment cost issues (Gane et al., 2014). For example, in the United States of America, access to the newer generation of direct-acting HCV anti-viral medications is in most cases dependent on the individual's ability to maintain relevant private health insurance cover (Canary, Klevens, & Holmberg, 2015). Further, in many developing countries interferon based HCV treatment protocols continue to remain the standard treatment for HCV, largely due to the cost-prohibitive nature of the newer direct-acting anti-viral HCV treatment protocols (Luhmann et al., 2015).

To date much of the research in HCV has focussed on developing bio-medical treatment prediction models (Chen & Morgan, 2006; Lee & Abdo, 2003; Shiffman et al., 2004). For example, Shiffman et al. (2004) conducted research to determine which individual demographic and bio-medical factors predicted treatment outcomes among a group of previous treatment non-responders. Results showed that: (1) previous treatment with interferon monotherapy, (2) HCV genotypes 2 or 3, (3) lower HCV serum levels, (4) achievement of a 12 week early viral response, (5) an AST: ALT ratio less than 1.0, (6) the absence of cirrhosis of the liver, along with the following behavioural predictors: (1) medication adherence, and (2) dosage compliance were all associated with an increased probability of the individual achieving a sustained viral response . By definition, an individual attained a sustained viral response if they achieved 'nil HCV detected' in two sequential blood tests measured at end of treatment and then at six months post end of treatment (Lee & Abdo, 2003; Shiffman et al., 2004). Similarly, Lee and Abdo (2003) identified the individual demographic and bio-medical factors that are important in predicting antiviral treatment response among individuals undergoing treatment for HCV. Their review of the HCV treatment literature revealed that: (1) HCV genotypes 2 or 3, (2) lower HCV serum levels, (3) combined interferon and ribavirin therapy, (4) shorter duration of HCV infection, (5) younger age (<40 years), (6) body weight (BMI within normal range), (7) the absence of illicit drug use, (8) the absence of cirrhosis or fibrosis of the liver, (9) lower hepatic iron levels, (10) low HCV heterogeneity, (11) female gender, (12) a low AST:ALT ratio, (13) the absence of both medical and mental health comorbidity, and (14) a 4 week rapid viral response or a 12 week early viral response, were all associated with an increased probability of the patient achieving a sustained viral response (Lee & Abdo, 2003).

In comparison to research into the biomedical markers of recovery from HCV, a relative paucity of research has focussed on potential psychosocial contributions to HCV treatment outcomes (Hagger & Orbell, 2003). This is despite a growing body of literature that has demonstrated the value of psychosocial contributions in explaining variance in both psychosocial adjustment and bio-medical treatment outcomes across a wide range of chronic diseases (Chilcot, Wellsted, & Farrington, 2011; van Diijk et al., 2009). For example, with respect to psychosocial adjustment, Rutter and Rutter (2002) demonstrated the ability of illness perceptions and coping strategies to account for variance in adjustment outcomes among a cohort of individuals with irritable bowel syndrome. Further, Chilcot et al. (2011) investigated the ability of illness perceptions to predict survival rates among a cohort of individuals with end stage renal disease. Chilcot et al. (2011) identified perceptions related to treatment control as an important predictor of survival independent of the contribution of other clinical markers.

In light of the limited research that has evaluated the role of psychosocial contributions in HCV treatment outcomes, the primary aim of the current study was to examine whether illness perceptions of individuals undergoing anti-viral treatment for HCV can account for variance in treatment outcomes. Illness perceptions represent attempts individuals make to understand or make sense of their respective illness experiences. Illness perceptions inform and influence subsequent coping behaviours which are linked to health related outcomes (Broadbent et al., 2006). Illness perceptions form part of Leventhal's Self-Regulatory Model (SRM) (Leventhal, Meyer, & Nerenz, 1980) and include illness consequence, timeline, personal and treatment control, illness identity, concern, coherence and emotional response (Broadbent et al., 2006; Leventhal et al., 1980). Research utilising the SRM has demonstrated its efficacy to predict biopsychosocial outcomes across a number of chronic illness areas including irritable bowel syndrome (Boddington, Myers, & Newman, 2002), diabetes (Cartwright & Lamb, 1999), chronic fatigue syndrome (Heijmans, 1998), Addison's disease (Heijmans, 1999), human immuno-deficiency virus (HIV) (Horne, Cooper, Fisher, Buick, & Weinman, 2001), epilepsy (Kemp, Morley, & Anderson, 1999), asthma (Horne & Weinman, 2002), rheumatoid arthritis (Moss-

Morris et al., 2002), cancer (Rees, Fry, & Cull, 2001), chronic obstructive lung disease (Scharloo et al., 1998), multiple sclerosis (Schiaffino & Cea, 1995), atrial fibrillation (Steed et al., 1999), and hypertension (Theunissen & de Ridder, 2001).

The present study tested the hypothesis that illness perception features of the SRM would contribute to variance in HCV anti-viral treatment outcomes.

Method

Participants

The first pre-treatment survey was completed by 126 individuals with HCV who were recruited via the study website. Out of this cohort, 32 participants completed the second survey post-commencement of HCV treatment. A number of recruitment strategies were utilised, including internet-based advertising methods (e.g., contacting Hepatitis C peak body websites across Australia), in addition to traditional hard-copy advertising flyers mailed to the residences of individuals preparing for HCV treatment at the Gold Coast University Hospital liver clinic. Inclusion criteria included a current HCV diagnosis, at least 18 years of age (HCV treatment is not available to individuals under the age of 18), access to the internet, and a current e-mail address. Ethical approval and informed consent was obtained prior to data collection. Table 1 summarises clinical, behavioural and demographic information.

Measures

Clinical, behavioural and demographic information. Participants at Time 1 responded to specific questions related to age, weight, HCV genotype, gender, and most likely route of HCV infection. Further, participants provided Time 1 yes/no responses to the following socio-demographic and clinical questions: (1) *"Did the liver biopsy or scan results indicate the presence of cirrhosis of the liver?"* (2) *"Do you have any other medical conditions that you are currently receiving treatment for?"* (3) *"In the past week, have you used recreational drugs?"* (4) *"In the past week, have you consumed any alcohol?"* (5) *"In the past week, have you smoked any cigarettes?"* (6) *"Do you have any mental health condition/s that you are currently receiving medication based treatment for?"*(e.g. depression/anxiety/psychosis), and (7) *"Have you ever had previous treatment for Hepatitis C?"* Further, at Time 2, participants responded with a yes/no to the following question related to treatment adherence: *"In reference to taking your Hepatitis C medication since commencing treatment; during the first 12 weeks of treatment, did you take your medication as prescribed?"*

Illness perceptions. Illness perceptions were measured using the Brief Illness Perception Questionnaire (BIPQ: Broadbent et al., 2006). The BIPQ has eight items (a ninth item that assesses causality using an open ended question was not included in the present study), each of which is rated on an 11-point Likert scale. Scores on each item range from 0 to 10. Sample items from the BIPQ include *"How much does your illness affect your life?"* and *"How concerned are you about your illness?"* (Broadbent et al., 2006). For the present study, the word "*illness*" was substituted with "*HCV*". Scoring was performed for each of the eight illness perception items, with five items measuring cognitive illness representations (illness consequences, timeline, personal control, treatment control, and identity), two items measuring emotional representations (concern and emotions), and one item measuring illness coherence or understanding. Higher scores on the illness consequence, timeline, identity, concern and emotions subscales are indicative of more negative or threatening illness perceptions. Conversely, higher scores on the personal control, treatment control and illness understanding subscales indicate more positive illness related perceptions. The BIPQ has shown good test-retest reliability and concurrent validity along with good predictive and discriminant validity (Broadbent et al., 2006).

Outcome Assessment. HCV treatment response was the outcome measure evaluated at Time 2 (post commencement of HCV treatment). At Time 2, participants were asked to indicate what blood tests (known as 'PCR' tests) they had since commencing HCV treatment, and to indicate the outcome for each test. Three questions covered week four, week eight, and week twelve PCR blood tests respectively. For each question, participants were asked to indicate either (1) 'Hepatitis C virus was detected in my blood' or (2) 'Hepatitis C virus was not detected in my blood'. A response indicating nil detection of HCV for at least one of the three milestone PCR blood tests was recorded as a 'treatment response' result for future statistical analysis. Due to the somewhat fluid nature of an individual's response to HCV treatment, not all patients achieve a 'treatment response' following week four or week eight 'PCR' tests. Importantly, failure to achieve a treatment response at the week 12 milestone 'PCR test', following on from previous non-response to treatment measured at week four and week eight 'PCR' tests, will in most cases lead to the discontinuation of treatment (Chen & Morgan, 2006; Lee & Abdo,

Table 1
Demographic, behavioural and clinical data (N = 32)

Characteristic	*n*	(%)	*M*	*SD*
Age			43.3	13.5
Weight (KG)			78.6	16.1
Gender				
Male	13	40.6		
Female	19	59.4		
Treatment adherence	30	93.8		
IV drug use route	11	34.4		
Cirrhosis (*n* =23)	7	30.4		
Genotype 1 (*n* = 26)	14	53.8		
Previous HCV treatment	8	25.0		
Medical co-morbidity	12	37.5		
Recreational drugs	7	21.9		
Alcohol use	8	25.0		
Smoking tobacco	10	31.3		
Mental health condition	7	21.9		

2003; Shiffman et al., 2004).

Procedure

Volunteers were directed to the study website. After providing informed consent they were given a unique personal login identifier and password that granted access to the first pre-treatment questionnaire (Time 1). Time 1 questionnaire required participants to respond to the BIPQ. Relevant clinical and demographic information was also collected (refer Table 1) at Time 1. Completion of the Time 1 survey took between 30 and 40 minutes. Participants were followed up three months post commencement of HCV treatment and were invited to complete a second online survey questionnaire (Time 2). At Time 2 participants responded to questions related to HCV treatment outcome, and to treatment adherence relevant to the treatment period. The Time 2 online survey took between 5 and 10 minutes to complete.

Statistical Analysis

An alpha level of .05 was utilised to determine statistical significance. Prior to the main tests, all variables were examined for accuracy of data entry, missing values, and fit between their distributions and assumptions of regression analysis. Preliminary analyses suggested the data were reasonably normally distributed. One-way ANOVA and independent t-tests were used to assess for gender differences on the measures. Results indicated that there were no significant gender differences therefore data analyses for the study were performed on the sample as a whole. Due to attrition between Time 1 (n=126) and Time 2 (n=32), independent samples t-tests, chi-square analyses and Fisher's exact tests were performed to assess for differences in clinical, behavioural, and demographic characteristics (refer Table 1), between those participants who completed the post-treatment questionnaire and those who did not. The only significant result to emerge was age in years; those who completed the post-treatment questionnaire (M = 46.98 years, SD = 13.55) were significantly older than participants who only completed the pre-treatment questionnaire (M = 41.58 years, SD = 11.12), $t(51) = 2.07$, $p = .04$.

Results

Differences in Treatment Response in Clinical Bio-Medical Markers

Independent t-tests, chi-square analyses and Fisher's exact tests were used to assess differences in the variables of interest as a function of treatment response. Results revealed significant differences between treatment responders and non-responders related to use of recreational drugs (Fisher's exact test $p < .05$) and the presence of a mental health condition (Fisher's exact test $p < .05$). There were no significant differences between responders and non-responders as a function of treatment adherence (Fisher's exact test $p > .05$), gender (χ^2 (1, 32) = .00, $p > .05$), IV drug use transmission (χ^2 (1, 32) = .00, $p > .05$), cirrhosis of the liver (Fisher's exact test $p > .05$), HCV Genotype 1 (χ^2 (1, 26) = 2.59, $p > .05$), previous HCV treatment (Fisher's exact test $p > .05$), reported medical comorbidity (χ^2 (1, 32) = 1.88, $p > .05$), recent alcohol use (Fisher's exact test $p > .05$), or regular cigarette smoking (Fisher's exact test $p > .05$). Treatment non-responders were not different in age (M = 42.84 years, SD = 12.48) from treatment responders (M = 43.73 years, SD = 14.91), $t(30) = -.19$, $p = .85$. Treatment non-responders did not differ in weight (M = 78.35 kg, SD = 16.58) from non-responders (M = 78.80 kg, SD = 16.03), $t(30) = -.08$, $p = .94$.

Treatment Response Differences in Illness Perception Features

To investigate differences in illness perception components as a function of treatment response, a multivariate analysis of variance (MANOVA) was performed. The eight illness perception components were included: Illness consequence, illness timeline, personal control, treatment control, illness identity, illness concern, illness coherence, and emotional response. Table 2 presents descriptive statistics, univariate F-values and effect sizes for treatment non-responders versus treatment responders on each of the dependent variables. Overall, only treatment control demonstrated a significant association with treatment response.

Multivariate Prediction of Treatment Response. A logistic regression was performed to assess whether treatment response could be independently predicted by each of the variables found to differentiate responders from non-responders as described above. Accordingly, mental health condition, substance use and treatment control were entered into the regression model. The full model containing the three predictor variables was statistically significant, χ^2 (3, N = 32) = 18.73, $p < .001$. The logistic model overall explained between 44% (Cox and Snell R square) and 59% (Nagelkerke R squared) of the variance in treatment response outcomes, and correctly classified 84% of the cases.

Table 2
Means and standard deviations for the illness perception variables as a function of treatment response

Variable	No Treatment Response (n = 17)		Treatment Response (n = 15)		Univariate		
	M	*SD*	*M*	*SD*	*F*	*p*	*eta*
Illness consequence	6.24	1.95	5.73	2.71	0.37	.55	.01
Illness timeline	6.53	2.15	5.00	3.18	2.59	.12	.08
Personal Control	4.59	2.60	4.00	2.51	0.42	.52	.01
Treatment Control	6.35	1.69	7.87	1.64	6.55	.02	.18
Illness identity	5.65	2.34	4.73	2.60	1.09	.30	.04
Illness concern	7.71	1.90	7.73	2.58	0.00	.97	.00
Illness coherence	6.42	2.37	7.53	1.68	2.32	.14	.07
Emotional response	5.88	2.89	5.53	3.07	0.11	.74	.00

Table 3 indicates that all three of the predictor variables made individual and statistically significant contributions to the prediction of treatment response outcomes. More specifically, the presence of a co-morbid mental health condition, substance use, and a stronger perception in the effectiveness of HCV treatment all uniquely predicted treatment response.

Discussion

Results of the current study demonstrated the ability of illness perceptions to predict HCV anti-viral treatment outcomes. Specifically, treatment control, or perceptions related to beliefs that HCV treatment could contribute to a favourable treatment response (i.e., significant reduction in HCV virus following milestone blood tests), predicted variance in HCV treatment outcomes. These results are consistent with Chilcot et al. (2011) who demonstrated that treatment control predicted survival rates among individuals with end stage renal disease after controlling for the impact of relevant clinical markers. Further, mental health comorbidity and substance use, made unique and significant contributions to the prediction of HCV treatment response such that the presence of mental health comorbidity and the use of substances as a coping strategy predicted more favourable treatment responses. Despite the relatively counter-intuitive direction of their contribution, these results are consistent with a number of previous studies (Chen & Morgan, 2006; Lee & Abdo, 2003; Shiffman et al., 2004) that have highlighted the important role of clinical markers within the treatment predictive framework, and are therefore worthy of future research to further investigate these respective findings.

Table 3.
Results of logistic regression for predicting treatment response in patients with HCV.

						95% CI for Exp(B)	
	B	S.E.	Wald	p	Exp(B)	Lower	Upper
Recreational Drugs	3.75	1.69	4.93	.03	42.50	1.55	1162.22
Mental Health Condition	3.06	1.42	4.64	.03	21.22	1.32	341.89
Treatment Control	.80	.36	4.95	.03	2.22	1.10	4.49
Constant	-7.04	2.83	6.17	.01	.001		

The SRM proposes that when individuals become aware of an illness experience they construct a number of illness related perceptions in an attempt to create understanding and meaning of what is happening. These illness perceptions are then proposed to drive coping behaviours with the aim of attaining favourable illness related outcomes (Broadbent et al., 2006; Leventhal et al., 1980). Within the present study the data highlighted the important role of treatment control within the HCV treatment predictive framework.In addition to the number of clinical markers that have been identified in the literature as contributing to variance in HCV treatment outcomes, such as particular HCV genotype and BMI (Chen & Morgan, 2006; Lee & Abdo, 2003; Shiffman et al., 2004), a significant factor that contributes to HCV treatment outcomes is the ability of an individual to effectively engage in self-management behaviours whilst on treatment (Shiffman et al., 2004). For example, adherence to HCV anti-viral treatment regimens often requires self-administration of anti-viral medications on a daily basis (Lee & Abdo, 2003; Shiffman et al., 2004). Levels of motivation to engage with required treatment regimens are likely to be influenced by perceptions of the efficacy of the prescribed treatments. Therefore greater treatment control perceptions would potentially have a significant influence on adherence based coping behaviours. In other words, it would seem unlikely that an individual would adhere to the requirements associated with HCV treatment if they held low perceptions related to treatment control.

Further, the SRM supports the premise that the cognitions associated with individual illness perceptions are amenable to psychological intervention (Chilcot et al., 2011; Hagger & Orbell, 2003; Leventhal et al., 1980). The results of the present study highlight the potential importance of assessing the illness perceptions of individuals preparing for HCV treatment, and either putting in place psychological interventions that address more maladaptive illness perceptions or strengthen more adaptive illness perceptions with the aim of creating optimal psychological platforms prior to the commencement of HCV treatment. Overall, the results of the present study support previous research conducted within the context of chronic disease and demonstrate the ability of illness perceptions to contribute to treatment outcomes (Chilcot et al., 2011; Rutter & Rutter, 2002; Steed et al., 1999). Further, the current study investigated the ability of illness perceptions to predict HCV treatment outcomes independent of the impact of mental health issues and substance use. Future HCV based research of this type should include measures of illness perceptions, coping strategies and psychosocial adjustment outcomes, in addition to bio-medical treatment outcomes, to further assess the ability of the SRM to predict both psychosocial and bio-medical outcomes within a prospective research model.

Certain limitations associated with the present study need to be noted. Firstly, the relatively small sample size at Time 2 compared to the baseline sample size at Time 1. In the present study a potential problem associated with significant differences between measurement periods presented with significant differences in participant's age in years between participants who did not complete HCV treatment in time 1 compared to those who did complete HCV treatment at Time 2. One potential recommendation for future research in this area may be to consider moving away from an anonymous online data collection design used in the present study, and rather focus on clinic based, face to face data collection designs that may potentially increase response rates, particularly at follow up data collection periods. Secondly, some of the methodological limitations (e.g., potential response bias)

associated with the use of self-report yes/no response questions for measuring clinical, behavioural and demographic information may have contributed to some of the more counter-intuitive results. Future related studies would do well to consider using standardised clinical measures as a way of potentially avoiding some of the more counter-intuitive results reported in the present study, particularly related to medication adherence, and other clinical markers such as substance use and mental health.

In Summary, the results of the present study further support the inclusion of psychological variables, as recommended within a number of related chronic disease studies (Fortune, Richards, Griffiths, & Main, 2002; Heijmans, 1999; Helder et al., 2002; Rutter & Rutter, 2002; Scharloo et al., 2000; Steed et al., 1999), within future HCV research that aims to predict treatment outcomes (Shiffman et al., 2004). In relation to clinical practice, these results further support the potential benefit of addressing maladaptive illness perceptions with the aim of improving clinical outcomes across the spectrum of physical illness.

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