

**Title:** Social support and mastery influence the association between stress and poor physical health in parents caring for children with developmental disabilities

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**Abstract**

To date, much of the research linking the stress of caring for children with developmental disabilities (e.g. Autism & Down syndrome) with parental health outcomes have tended to concentrate on mental health with less attention paid to the physical health consequences. Thus, this study sought to explore the psychosocial predictors of poor physical health in these caring parents. One hundred and sixty-four parents (108 caregivers and 58 control parents) completed measures of stress, child problem behaviours, social support, mastery and physical health. Parents of children with developmental disabilities had poorer physical health compared to control parents. Stress and mastery, but not social support and problem behaviours, were significant predictors of poor physical health within caring parents for children with developmental disabilities. However, the association between mastery and physical health was mediated by perceived stress such that those parents who were higher on mastery reported less stress and better physical health; furthermore, the association between stress and physical health was moderated also by social support; those parents high on social support and low in stress had better physical health. These results indicate that the paths between psychosocial factors and poor physical health in the caring parents are working synergistically rather than in isolation. They also underscore the importance of providing multi-component interventions that offer a variety of psychosocial resources to meet the precise needs of the parents.

**Keywords:** Parents, developmental disability, physical health, mastery, social support, stress

## 1. Introduction

A wealth of research attests to the negative psychological impact of caring for a child with developmental disability (e.g. Autism, Down syndrome, and Fragile X) on parents. Although some parents cope well with the demands and challenges of caring for a child with a developmental disability (DD; Ollson & Hwang, 2008; Scorgie et al., 1998), others do not, and as a consequence are more likely to experience outcomes such as distress (Gallagher & Hannigan, 2014; Thurston, Loney, Wong & Browne, 2011), anxiety, low self-esteem, depression (Ollson & Hwang, 2008), poorer general emotional health, and pessimism about the future. More recently a call for researchers to examine the physical health of these caring parents has been made (Miodrag & Hodapp, 2010), which seems particularly pertinent given likely economic costs of illness in carers. Consequently, research efforts have begun to explore the physical health of caring parents.

In fact, research has found that relative to age- and gender matched control parents, parents of children with DD have poorer physical health for e.g. poor sleep, greater risk of hypertension, arthritis, increased headaches and higher rates of infection (Gallagher & Whitley, 2013; Lovell et al., 2012; Resch, Elliott, & Benz, 2012). Moreover, poor physiologically functioning is the likely underlying mechanism behind the poor health in caring parents (Gallagher et al., 2009; Lovell et al., 2012; Ruiz-Robledillo et al., 2014; Seltzer et al., 2001). Although the two key factors that drive this association, social support and child problem behaviours, have received the bulk of attention from researchers, less attention is paid to coping styles. Further, research has established that physical health in these caring parents was best explained not by single psychological factors but more so by the interaction of two predictors variables (Gallagher & Whiteley, 2013). In that case, child problem behaviours exacerbated perceptions of stress to negatively impact physical health. Taking a piecemeal approach rather than testing integrated models has been criticised

(Matthews & Gallo, 2011), indicating that this type of synergistic research is clearly warranted.

Child behaviour issues, particularly externalizing behaviours such as hyperactivity and conduct problems have consistently been shown to explain a significant proportion of the variance in parental distress and poor physical health in caring parents (Baker, Seltzer & Greeneberg, 2012; Hodapp, Fidler, Smith, & Hodapp, 1998; Blacher & McIntyre, 2006; Floyd & Gallagher, 1997; Gallagher et al., 2009; Hastings, Daley, Burns, & Beck, 2006).

Problematic behaviours were found to moderate the association between stress and physical health (Gallagher & Whiteley, 2013), such that parents who reported more problem behaviours also reported more perceived stress and poorer health. However, stress in parents has also been shown to vary with social support (Bailey, Wolfe, & Wolfe, 1994; Dunn, Burbine, Bowers, & Tantleff-Dunn, 2001); those who report more social support tend to report less stress. Although social support is vital for physical health (for review see Uchino, 2009) and has been shown to have a direct effect on blood pressure and immune function in parents (Gallagher & Whiteley, 2012; Lovell et al 2012; Ruiz-Robledillo et al. 2014), one pathway through which social support exerts its effect on health is through stress buffering.

The transactional model of stress (Lazarus & Folkman, 1984) suggests internal and external resources are influential in determining an individual's stress appraisals. Social support is a key external resource that has been found to influence stress appraisals (see Uchino, 2009). According to the stress buffering hypothesis (Cohen & Wills, 1985) social support, particularly perceived support, impacts health outcomes through its influence on the appraisal of the stressful situation. Those with a high level of perceived social support are less likely to appraise a situation as stressful as those with low social support. Therefore, parents with high levels of perceived social support are more likely to report fewer negative reactions to parenting stress than parents with low social support. To our knowledge, no study

has examined the buffering role of social support on stress appraisals in this context, although positive appraisals were associated with lower depression and lower perceptions of stress among parents (Trute et al., 2010), implying that there may be a key role for the influence of social support in stress appraisals in this context. Thus, given that social support is inversely related to psychological issues such as depression and anxiety and is expected to “buffer” parents from stress through influencing how they perceive the stressful situation, it could be that social support influences physical health in these caring parents through its impact on perceptions of stress.

In terms of the transactional model of stress, individuals appraising stressors as controllable are theoretically believed to display an attenuated response to stressors (Lazarus & Folkman, 1984). And consistent with this, mastery or the belief that one has control over life’s obstacles has been associated with better psychological health (Haidt & Rodin 1999; Singer & Farkas, 1989), as well as better caregiver physical health (Roepke et al., 2008, including lower incidence of coronary heart disease (Lundgren et al. 2014), better self-rated health, better functional status, and lower mortality (Seeman & Lewis 1995). However, whether or not mastery has similar protective effects against poor physical health in these caring parents has yet to be investigated. Further, although the influence of mastery on levels of problem behaviour and psychological health in parents of children with DD has been examined (Paczkowski & Baker, 2007; Raina et al., 2004) the interactive pathways between perceived stress, social support, mastery and physical health have not been tested. In fact, to our knowledge, this is the first study to test these interactive pathways and it is in line with a recent call for researchers in paediatric psychology to use contemporary statistical techniques to test interactive effects (Karazsia, Berlin, Armstrong, Janicke, & Darling, 2013). We hypothesise that control of stressful situations will consequently enable parents to feel more confident and masterful hence protecting their health (Hastings et al., 2006). Thus, it could be

that the association between mastery and physical health may be explained again by its impact on parental stress appraisals.

So to develop an understanding we take these variables mastery, stress appraisal, social support and test their effects interactively for those caring for a child with DD. Based on the evidence, it is hypothesised first, that compared to age-and gender matched control parents, parents caring for children with DD will report poorer physical health. Second, that mastery and social support will be positively associated with better physical health whereas behaviour problems and perceived stress will be associated with poorer physical health in parents of children with DD. Third, that the relationship between mastery and physical health will be mediated by stress. Finally, the association between perceived stress and physical health in these caring parents will be moderated by social support.

## **2. Method**

### *2.1. Participants, design and procedure*

This study had a cross sectional design with two sets of parents recruited and variables measured across two cohorts. Parents were recruited through word of mouth and University survey recruitment lists via e-mail. Although the survey questionnaire was accessible both online, via survey software (survey monkey) hard copies were made available, most parents completed the questionnaire online (99.1 %) which has been found to be a robust method for data collection (Deutskens, de Ruyter & Wetzels, 2006). Parents of children with DD were recruited through invitation letters distributed by local schools for children with special needs and by organisations supporting parents of children with developmental disabilities. Invitation letters were also placed by such organisations on their social media pages (e.g. Facebook). Inclusion criteria for parents were providing care to a child with a developmental disability under the age of eighteen who lived at home. Forty-five per cent of parents reported caring for children with autistic spectrum disorder, 10%, with

Down's syndrome and 45% with mixed disabilities. In total 109 parents of children with DD and 58 control parents completed the questionnaire. The study was approved by the relevant University Research Ethics Committee and all participants gave informed consent.

## 2.2. Measures

### 2.2.1. Socio demographic characteristics

Respondents provided information on their age, gender, marital status, education level, ethnicity, number of children under the age of 18 in the household, the child's age and if they had a disability. Socio-economic status was measured using The Registrar General's social classification (Office of Censuses and Surveys, 1972). Participants were asked to specify their occupation, which was scored, 1, professional (e.g. physician), 2, managerial (e.g. director), 3, non-manual/clerical (e.g. secretary), 4, skilled manual (e.g. carpenter), 5, semi-skilled manual (e.g. bus driver), 6, unskilled manual (e.g. labourer). A simple categorical scoring of manual (4,5,6) vs non-manual (1,2,3) was created. This measure has been used in previous caregiver research (Gallagher & Whitley, 2013).

### 2.2.2. Psychological Stress

The 4-item Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) was used to measure psychological stress over the previous month. This scale, used previously in caregiver research (Gallagher, Phillips and Carroll, 2009; Vedhara et al., 2002) measures how stressful individuals perceive situations they have experienced over the last month. Scale responses range from 0, never, to 4, very often, and include two reverse scored items, with higher scores indicating greater perceived stress. Items in the scale include 'In the past month, how often have you felt able to control the important things in your life?' and 'In the past month, how often have you felt things were going your way?' The scale has shown high internal consistency reliability (Cronbach's  $\alpha = .88$ ) in previous research (Gallagher &

Whiteley, 2013). In the present study a high internal consistency reliability of  $\alpha = .80$  was observed.

### 2.2.3. *Mastery*

The Personal Mastery Scale (Pearlin & Schooler, 1978) is a 7-item scale that measures the extent to which an individual feels control over life outcomes. Items include “I often feel helpless in dealing with the problems of life” and “What happens to me in the future mostly depends on me”. Items are scored on a scale from 1 (“strongly agree”) to 4 (“strongly disagree”), and negatively worded items are reversed scored. Higher scores indicate higher mastery. This scale is one of the most widely used measures in health research and a high internal reliability has been found in previous caregiver research (Cronbach’s  $\alpha$  0.73; Sherwood et al. 2007). In the present study a good Cronbach  $\alpha$  .82 was observed.

### 2.2.4. *Social support*

Social support was assessed with the 12- item Support functions scale (Dunst et al., 1984). Parents were asked to rate sources of support available to them on a 5- point Likert scale ranging from 1 (“never”) to 5 (“quite often”). Sources of support available include practical support (e.g. someone to help take care of your child) and emotional support (e.g. someone to talk about things that worry you). Both the total score and the total of the subscales were used for analysis with higher scores indicating more social support. Others have used this scale previously (Gallagher et al., 2009; Gallagher & Whitely, 2012). A high internal consistency reliability was shown in the present study for the total scale  $\alpha$  .91, emotional support subscale  $\alpha = .85$  and practical support subscale  $\alpha = .85$ .

### 2.2.5. *Child Challenging behaviours*

The Strengths and Difficulties questionnaire (SDQ; Goodman, 1997) was used to measure child challenging behaviours. However, only two of the subscales measuring conduct disorder (e.g. 'often argumentative with adults'; 5 – item) and hyperactivity (e.g. easily distracted, concentration wanders; 5 - item) were chosen as previous research has indicated that these challenging behaviours are one of the main sources of stress in these parents (Sipal, Schuengel, Voorman, Van Eck & Becher, 2009). The questionnaire has been used extensively in research with children with DD and their parents (e.g. Beck et al., 2004; Hastings et al., 2006). Parents self-report whether a behaviour is somewhat true (scored 0), true (scored 1) or certainly true (scored 2) of their child, some items are reversed scored (e.g. generally obedient, usually does what adults request). Higher scores indicated more problem behaviour. The scale has been shown to be reliable (Cronbach's  $\alpha = .78$ ) and effective at identifying challenging behavioural problems in children (Goodman & Scott, 1999). Internal consistency reliability in this study was adequate Cronbach  $\alpha$  0.78, reliability for the subscales were also adequate; hyperactivity ( $\alpha$  0.68) and conduct ( $\alpha$  0.79).

### 2.2.6. *Physical Health*

Self-report parental physical health was assessed with the Physical Health Questionnaire (PHQ; Schat et al., 2005). This brief 14-item self-report scale of somatic symptoms including sleep disturbances (Have you woken up during the night), headaches (Have you experienced headaches), gastrointestinal problems (have you suffered from an upset stomach), and respiratory infections (have you had respiratory infections more severe than minor colds that "laid you low"). Parents are asked to rate how often they have experienced these symptoms during the last year, from 1 (not at all) to 7 (all of the time). A higher score is an indication of poorer physical health. This scale has been used in parental carer research previously (Gallagher & Whiteley, 2013) and has shown good internal

consistency. In the current study a Cronbach  $\alpha$  .84 was obtained, values for subscales were; sleep disturbance ( $\alpha$ .04), headaches ( $\alpha$ .92), gastrointestinal problems ( $\alpha$ .88) and respiratory infections episodes ( $\alpha$ .80). A single item question which asked parents ‘Compared to others of your age and sex, how would rate your general health?’ was included, the response was either, excellent (scored 5), above average (scored 4), average (scored 3), below average (scored 2) or very poor (scored 1).

### 2.3. Statistical analyses

Initial analyses of group differences were by Chi-square, t-Test, and univariate (ANOVA) with partial eta – squared ( $\eta^2_p$ ) as the measure of effect size. Bivariate correlation analyses was used to determine whether any demographic variables, caregiver characteristics, mastery, perceived stress or social support were related to physical health in the caregiver group. Subsequent analyses focused on within group analyses, i.e., psychosocial predictors of poor physical health in parents caring for children with disabilities. Indirect effects analysis was conducted using the PROCESS macro created by Preacher and Hayes (2012) in SPSS. The bootstrap procedure was used to further evaluate the significance of the mediator. We based the estimate of the indirect effect by running 1,000 bootstrap iterations of computed samples and used a 95% confidence interval (CI). A mediation model (Model 4) tested the mediating effect of perceived stress on the relationship between mastery and PHQ. A moderation model (Model 1) was used to test if the association between perceived stress and physical health was moderated by perceived support.

## 3. Results

### 3.1. Parental socio-demographic characteristics, psychosocial factors and physical health

In terms of socio-demographics, the majority of participants were female (91%;  $m_{age} = 40.1$ ,  $SD = 7.2$  years), white (97%) and married (72%) with the remainder of the sample

separated/ divorced (13%), single (14 %), or widowed (1%). Parents had an average of two children and the median age of the children in the control group was slightly lower however number of children in family and age of child were not related to outcome variables. The two parent groups matched on socio economic status  $U = 2684, z = -.824, p = .41$ , the median income level of parents was in the €20,000 - €40,000 bracket. Other pertinent characteristics of the parental group are presented in Table 1. As can be seen the two parental groups did not differ significantly on age, gender and marital status.

[Insert Table 1 about here]

Parents of children with DD reported higher perceived stress, lower mastery, less social support and more physical health problems than control parents (see Table 1). Moreover, the effect sizes (partial eta-squares of  $(\eta^2_p)$  .48, .46, .38, and .47, respectively) signify large and medium significant differences. Analysis of the PHQ subscales indicated significant differences between the parental groups on all 4 subscales; sleep disturbance,  $U = 2384, z = 2.63, p < .01$ , headaches,  $U = 1517, z = 5.54, p < .000$ , gastrointestinal  $U = 2141, z = 3.43, p < .001$  and respiratory infections,  $U = 1968, z = 4.03, p < .000$ . Parents of children with DD reported their health as worse across all domains. Moreover, parents of children with DD rated their health as average compared to control parents who rated their health as above average.

### *3.2. Associations between predictor variables and physical health in parents caring for children with developmental disabilities*

Preliminary analyses were conducted to check for associations between caregiver demographics and physical health. Only gender was related to physical health ( $p < .05$ ), with females reporting worse overall health,  $U = 257, z = -2.20, p < .05$ , than males. Perceived

stress was positively correlated with physical health and mastery was negatively correlated with physical health suggesting that parents who are high on perceived stress and lower on mastery report worse physical health (See Table 2). Regarding the PHQ subscales, mastery was associated with all four health subscales but more so with sleep disturbance ( $r = -.287$ ;  $p < .01$ ); perceived stress was associated with gastrointestinal problems ( $r = .310$ ;  $p < .01$ ). Surprisingly, behaviour problems and social support were not associated with physical health. But social support was significantly associated with mastery and perceived stress, with mastery associated with higher perceived emotional support (see Table 2).

[Insert Table 2 about here]

### *3.3. Mediation and moderation analyses of predictors of poor physical health in parents caring for children with developmental disabilities*

#### *3.3.1. Mediation*

A PROCESS mediational analysis (Model 4) was used to explore whether perceived stress was a mediator of the relationship between mastery and physical health (see Figure 1 for mediational model and path estimates). The overall relationship between mastery and physical health was significant  $\beta = -.97$ ,  $SE = .35$ ,  $t(109) = 2.76$ ,  $p < .01$ . Mastery was a significant predictor of perceived stress  $\beta = -.36$ ,  $SE = .07$ ,  $t(109) = 5.50$ ,  $p < .001$  and perceived stress significantly predicted physical health  $\beta = 1.19$ ,  $SE = .50$ ,  $t(109) = 2.13$ ,  $p = .036$ . A significant indirect effect of mastery on physical health through perceived stress was observed,  $ME = -.43$ ,  $SE = .20$ , 95% CI  $[-.90, -.86]$ , mastery no longer predicted physical health (to  $\beta = -.53$ ,  $SE = -.39$ ,  $t(109) = 1.38$ ,  $p = .17$ ). Therefore these results suggest that for parents of children with DD, the association between mastery and physical health is partly explained by perceptions of stress.

### 3.3.2. Moderation

A moderation was conducted (Model 1 of the PROCESS model) to explore whether perceived support moderated the association between perceived stress and physical health. Analysis indicated that total perceived support and not either of the subscales, emotional or practical, did moderate the pathway between perceived stress and physical health  $\beta = .1259$ ,  $SE = .056$ ,  $t(109) = 2.25$ ,  $p < .05$ . There is a significant indirect effect of perceived stress on physical health for medium  $ME = 1.69$ ,  $SE = .46$ , 95 % CI [.78, 2.61] and high  $ME = 2.94$ ,  $SE = .75$ , 95% CI [1.44, 4.44] levels of perceived support but not for low levels of perceived support  $ME = .45$ ,  $SE = .65$ , 95 % CI [-.83,1.74] (see Figure 2 for illustration). These results indicate the interactive paths between factors which influence physical health in parents, it can be seen that mastery, stress appraisal and social support are central components in protecting physical health but the effects are synergistic.

## 4. Discussion

The present study confirmed that caring for children with DD is more strongly associated with poor reported physical health than caring for a typically developing child (Gallagher & Whiteley, 2013; Lovell et al., 2011; Raina et al. 2005). The domains of physical health most affected were sleep, headaches, gastrointestinal and respiratory problems. These particular parents also reported higher perceived stress and lower scores on social support and self-mastery. Moreover, sleep problems (Gallagher et al., 2010; Hemmingsson, Stenhammar, & Paulsson, 2009) and headaches (Mörelus & Hemmingsson, 2013) have been highlighted as a significant cause of concern for these caring parents and tend to persist over time. In other caring contexts, sleep problems and headaches have also been found to be predictive of future health problems (McCurry et al 2009) and have also been found to be associated with an increased risk of developing depression (Geerlings et al., 2000). Further, relative to

control parents, parents of children with DD self-rated health their health as lower than the control; it is worth noting that self-rated health is a predictor of future morbidity (Idler & Benyamini, 1999).

In terms of the psychosocial pathways driving this poor physical health in parents of children with DD, we found that perceived stress was associated with poor physical health. This aligns with other studies in the field (Gallagher & Whiteley, 2013; Lovell et al., 2011; Raina et al. 2005). Although child problem behaviours were not associated with poor physical health, the association was in the expected direction, i.e., it was positive; this lack of association may have been a consequence of only two subscales from the SDQ being used and not the full scale. A similar non-significant association was evident for social support, which is unlike other studies on psychological and physiological health outcomes in these parents (Dunn et al., 2001; Gallagher & Whiteley, 2012; Lovell et al., 2012). However, our main aim was to explore the buffering role of social support on the perceived stress - physical health relationship. Social support has long been lauded as one of the principal psychosocial factors associated with health outcomes, both psychological and physical, and has previously been found to buffer stress in parents caring for children with DD (Dunn, Burbine, Bowers, & Tantleff-Dunn, 2001; Eisenhower et al., 2005). Even though our findings lend support to this line of research we have found that this interaction is more nuanced in this context. According to the stress buffering hypothesis, social support should only be associated with better physical health in high stress situations, but not in low stress situations (Cohen & Wills, 1985). Here, the association between perceived stress and physical health was only attenuated by high social support when stress was low and not high. This result may reflect that although some parents report high perceived support, the type of support they need when highly stressed may not be the support they perceive to have accessible to them. When in a situation that is extremely stressful they may need immediate formal support such as respite

care and they may not have this type of support available to them (Gallagher & Whiteley, 2012; Raif & Zimmerman, 1993).

In fact, the stress buffering effect of social support has been shown to be most effective when the type of support matches the needs of the stressful event (Uchino, 2009). This finding may reflect that for these parents who are experiencing high levels of stress, perhaps they need formal or practical support such as respite or interventions. Indeed, the reported median for practical support here (13) was significantly lower than the median for emotional support (19) which could indicate that at higher levels of perceived stress emotional support is not sufficient. Further, recent qualitative studies have found that during periods of high stress when actual or practical social support is not available to parents, they rely on other less effective coping strategies (Gallagher, Phillips, Lee & Carroll, Forthcoming; Gray, 2006). Similarly, parents experiencing high stress and who relinquish care of their child to social services are more likely to do so because they feel unsupported or do not have the right support to meet their needs (Nankervis, Rosewarne, & Vassos, 2011). Thus, in this context perceived availability of social support may not be enough to cope with the extraordinary demands of caring for children with DD, rather in high stress situations it is actual social support that is needed and support that matches the needs of the family (Nankervis, Rosewarne, & Vassos, 2011).

Another psychological factor that was important in shielding against poor physical health in parents of children with DD is mastery. Self-mastery has been found to have important associations for health in other caring contexts (Roepke et al., 2008) and has implications for both physical and psychological functioning (Benyamini, Blumstein, Murad, & Lerner-Geva, 2011; Bovier, Chamot, & Perneger, 2004). The pathway to how mastery may be associated with physical health suggests that an interactive pathway between perceived stress, mastery and physical health, the results suggest that this is the case and an

indirect path from mastery to perceived physical health through perceived stress was found. Therefore the benefit of mastery to physical health appears to be through its effect on stress appraisal which is consistent with the transactional model of stress (Lazarus & Folkman, 1984). Support for the beneficial impact of stress appraisal on psychological outcomes in parents of children with DD is well substantiated (Trute et al., 2010). The results of this study also suggest that mastery may be a key factor in buffering physical health through its association with stress appraisal. Dealing with challenging behaviours from their children or struggling to access essential services may leave parents feeling they have little control over situations, which can often lead to feelings of loss of control, hopelessness or despondency (Van den Borne et al., 1999). A high sense of mastery therefore is a beneficial resource in dealing with stressful situations and through the interaction with stress appraisal has been shown to be beneficial for physical health. Moreover, given the importance of mastery and control for stress appraisals, it is welcome news that these concepts are now being employed in the development of psychosocial interventions for caregivers (Blom et al., 2013; Solomon, Ono, Timmer, and Goodlin-Jones, 2008). For example, psychosocial interventions that include methods for increasing mastery concentrate on building coping skills and in the first stage of the program parents were coached until they reached maximum mastery capacity after which they continued onto the second part of the program which involved parent directed interaction and these in turn impacted perceptions of stress and well-being. Similarly, parenting programmes for pre-schoolers with DD have been found to improve mastery and reduce stress in these parents (Ingersoll & Wainer, 2013), lending further support to our data.

#### *4.1. Limitations*

The limitations of the present study include the use of a cross sectional study ensuring inferences about causation are not possible. A further limitation is the self-selection of participants who responded to requests for participation, therefore our findings cannot be generalised. The reliance on self-report measures means that the study was also restricted to the parents' assessment of their own well-being; which can be affected by stress levels and psychological health. Despite this, self-report measures are commonly used in caregiver research and have been shown to be reliable and valid. Although a significant difference was found in physical health between parental groups, the median score in physical health for the parents of children with DD (53) was lower than reported in UK samples (Gallagher & Whiteley, 2013). Additionally, perhaps the use of a scale such as the Family Support Scale (Dunst et al., 1984) which focused formal and informal sources of support (helpfulness of sources of support) support rather than on perceived support may have led to different results. Finally, it is difficult to know what type of stressor was being perceived as most challenging as the PSS does not capture such data. Future studies could try and assess this in more detail.

#### *4.2. Conclusion*

In summary, the present study extended research on the underlying pathways in which stress is associated with physical health in parents of children with DD. In this study we have demonstrated an interactive pathway between mastery, perceived stress, perceived support and physical health. Our findings underscore the importance of providing actual support or respite interventions during periods of high stress (Shattuck, et al., 2011; Nankervis, Rosewarne, & Vassos, 2011) to improve the health of these families. The results also suggest that the mastery may be a key mechanism in shielding parents of children with DD from poor physical health through its influence on stress appraisals. Finally, these data indicate that social support and mastery may be key factors that influence how stress impacts the physical

health of parents of DD children and psychosocial interventions harnessing these concepts are currently the focus of research efforts (Blom et al. 2013; Ingersoll & Wainer, 2013; Solomon et al., 2008). Moreover, identification of psychosocial resource factors may help health professional's identify key targets for interventions that may, in turn, improve the health of parents of children with DD.

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## References

- Bailey, D., Wolfe, D., & Wolfe, C. (1994). With a little help from our friends: Social support as a source of well-being and of coping with stress. *Journal of Sociology and Social Welfare, 21*, 127–152.
- Baker, J., Seltzer, M., & Greenberg, J. (2012). Behaviour problems, maternal internalising symptoms and family relations in families of adolescents and adults with fragile X syndrome. *Journal of Intellectual Disability Research, 56*(10), 984-995.
- Beck, A., Daley, D., Hastings, R., & Stevenson, J. (2004). Mothers' expressed emotion towards children with and without intellectual disabilities. *Journal of Intellectual Disability Research, 48*(7), 628-638.
- Benyamini, Y., Blumstein, T., Murad, H., & Lerner-Geva, L. (2011). Changes over time from baseline poor self-rated health: For whom does poor self-rated health not predict mortality? *Psychology & Health, 26*(11), 1446-1462.
- Blacher, J., & McIntyre, L. (2006). Syndrome specificity and behavioural disorders in young adults with intellectual disability: Cultural differences in family impact. *Journal of Intellectual Disability Research, 50*(3), 184-198.
- Blom, M., Bosmans, J., Cuijpers, P., Zarit, S. & Pot, A. (2013). Effectiveness and cost-effectiveness of an internet intervention for family caregivers of people with dementia: design of a randomized controlled trial *BMC Psychiatry, 13*:17.
- Bovier, P., Chamot, E., & Perneger, T. (2004). Perceived stress, internal resources, and social support as determinants of mental health among young adults. *Quality of Life Research, 13*(1), 161-170.
- Cohen, S., & Wills, T. (1985). Stress, social support, and the buffering hypothesis. *Psychological bulletin, 98*(2), 310.
- Dunn, M., Burbine, T., Bowers, C., & Tantleff-Dunn, S. (2001). Moderators of stress in parents of children with autism. *Community mental health journal, 37*(1), 39-52.
- Dunst, C., Jenkins, V., Trivette, C. (1984) The Family Support Scale: Reliability and validity. *Journal of Individual, Family, and Community Wellness, 1* (5): 45-52.
- Deutskens, E., de Ruyter, K., & Wetzels, M. (2006). An assessment of equivalence between online and mail surveys in service research. *Journal of Service Research, 8*(4), 346-355.

- Eisenhower, A. S., Baker, B. L., & Blacher, J. (2005). Preschool children with intellectual disability: syndrome specificity, behaviour problems, and maternal well-being. *Journal of Intellectual Disability Research*, 49(9), 657-671.
- Floyd, F. J., & Gallagher, E. M. (1997). Parental stress, care demands, and use of support services for school-age children with disabilities and behavior problems. *Family Relations*, 359-371.
- Gallagher, S. & Hannigan, A. (2014). Depression and chronic health conditions in parents of children with and without developmental disabilities: The Growing Up in Ireland cohort study. *Research in Developmental Disabilities*, 35, 448–454
- Gallagher, S., Phillips, A. C., & Carroll, D. (2010). Parental stress is associated with poor sleep quality in parents caring for children with developmental disabilities. *Journal of Pediatric Psychology*, 35(7), 728-737.
- Gallagher, S., Phillips, A. C., Drayson, M. T., & Carroll, D. (2009). Parental caregivers of children with developmental disabilities mount a poor antibody response to pneumococcal vaccination. *Brain, behavior, and immunity*, 23(3), 338-346.
- Gallagher S. & Whiteley J. (2012) Social support is associated with blood pressure responses in parents caring for children with developmental disabilities. *Research in Developmental Disabilities*, 33, 2099-2105.
- Gallagher, S., & Whiteley, J. (2013). The association between stress and physical health in parents caring for children with intellectual disabilities is moderated by children's challenging behaviours. *Journal of health psychology*, 18(9), 1220-1231.
- Geerlings, S., Beekman, A., Deeg, D., & Van Tilburg, W. (2000). Physical health and the onset and persistence of depression in older adults: an eight-wave prospective community-based study *Psychological Medicine*, 30, 369±380.
- Goodman R, (1997) The Strengths and Difficulties Questionnaire: a research note. *Journal of Child Psychology & Psychiatry*, 38(5), 581-6.
- Gray, D. E. (2006). Coping over time: The parents of children with autism. *Journal of Intellectual Disability Research*, 50, 970–976.
- Haidt, J., & Rodin, J. (1999). Control and efficacy as interdisciplinary bridges. *Review of General Psychology*, 3(4), 317.
- Hastings R.P., Daley D., Burns C. & Beck A. (2006). Maternal distress and expressed emotion: Cross-sectional and longitudinal relationships with behavior problems of children with intellectual disabilities. *Journal Information*, 111, 48-61.

- Hemmingsson, H., Stenhammar, A. M., & Paulsson, K. (2009). Sleep problems and the need for parental night-time attention in children with physical disabilities. *Child: Care, health and development*, 35(1), 89-95.
- Hodapp, R. M., Fidler, D. J., & Smith, A. C. M. (1998). Stress and coping in families of children with Smith-Magenis syndrome. *Journal of Intellectual Disability Research*, 42(5), 331-340.
- Idler, E. & Benyamini Y. (1999). *Self-rated health and mortality: a review of twenty-seven community studies. J Health Soc Behavior*, 38, 21– 3.
- Ingersoll, B. & Wainer, A. (2013). Pilot study of a school-based parent training program for preschoolers with ASD. *Autism*, 17(4), 434-448.
- Lazarus, R. S., & Folkman, S. (1984). *Stress. Appraisal and Coping*, New York.
- Lovell, B., Moss, M., & Wetherell, M. A. (2012). With a little help from my friends: Psychological, endocrine and health corollaries of social support in parental caregivers of children with autism or ADHD. *Research in developmental disabilities*, 33(2), 682-687.
- Lundgren, O., Garvin, P., Jonasson, L., Andersson, G., & Kristenson, M. (2014). Psychological Resources are Associated with Reduced Incidence of Coronary Heart Disease. An 8-Year Follow-up of a Community-Based Swedish Sample. *International journal of behavioral medicine*, 1-8.
- Mailick Seltzer, M., Greenberg, J. S., Floyd, F. J., Pettee, Y., & Hong, J. (2001). Life course impacts of parenting a child with a disability. *American Journal On Mental Retardation*, 106(3), 265-286.
- Matthews, K.A, & Gallo, m L.C. (2012). Psychological Perspectives on Pathways Linking Socioeconomic Status and Physical Health. *Annu Rev Psychol.*, ( 62), 501–530.
- Martire, L. M., & Schulz, R. (2007). Involving family in psychosocial interventions for chronic illness. *Current Opinions in Psychological Science*, (16), 90–94.
- McCurry, S., Laura E. Gibbons, L., Logsdon, R., Vitiello, M., & Teri, L. (2009). Insomnia in Caregivers of Persons with Dementia: Who is at Risk and What Can be Done About It? *Sleep Med Clin*. 4(4), 519–526.
- Meltzer, L. & Moore, M. (2008). Sleep disruptions in parents of children and adolescents with chronic illnesses: prevalence, causes, and consequences. *Journal of pediatric psychology*, 33(3), 279-291.

- Miodrag, N., & Hodapp, R. M. (2010). Chronic stress and health among parents of children with intellectual and developmental disabilities. *Current Opinion in Psychiatry*, 23(5), 407-411.
- Mörelus, E., & Hemmingsson, H. (2013). Parents of children with physical disabilities - perceived health in parents related to the child's sleep problems and need for attention at night. *Child: Care, Health And Development*.
- Nankervis, K., Rosewarne, A., & Vassos, M. (2011). Why do families relinquish care? An investigation of the factors that lead to relinquishment into out-of-home respite care *Journal of Intellectual Disability Research*, 55(4), 422-433.
- Olsson, M. B., & Hwang, C. P. (2008) Socioeconomic and psychological variables as risk and protective factors for parental well-being in families of children with intellectual disabilities. *Journal of Intellectual Disability Research*, 52, 1102-1113.
- Office of Population Censuses and Surveys (1978). *Occupational Mortality 1970-72*. London: HMSO
- Paczkowski, E., & Baker, B. L. (2007). Parenting children with and without developmental delay: the role of self-mastery. *Journal of Intellectual Disability Research*, 51(6), 435-446.
- Pearlin, L. I., & Schooler, C. (1978). The structure of coping. *Journal of health and social behavior*.
- Raif, R., & Rimmerman, A. (1993). Parental attitudes to out-of-home placement of young children with developmental disabilities. *International Journal of Rehabilitation Research*, 16, 97-105.
- Raina, P., O'Donnell, M., Rosenbaum, P., Brehaut, J., Walter, S., Russell, D., Swinton, M., Zhu, B., & Wood, E. (2005). The health and well-being of caregivers of children with cerebral palsy. *Pediatrics*, 115(6), 626-36.
- Resch, J., Benz, M. R. & Elliott, T. R. (2012). Evaluating a dynamic process model of wellbeing for parents of children with disabilities: A multi-method analysis. *Rehabilitation Psychology*, 57, 61-72.
- Roepke, S., Mausbach, B., Aschbacher, K., Ziegler, M., Dimsdale, J., Mills, P. (2008). Personal mastery is associated with reduced sympathetic arousal in stressed Alzheimer caregivers. *American Journal of Geriatric Psychiatry*, 16, 310-317.
- Ruiz-Robledillo, N. N., De Andrés-García, S. S., Pérez-Blasco, J. J., González-Bono, E. E., & Moya-Albiol, L. L. (2014). Highly resilient coping entails better perceived health, high

- social support and low morning cortisol levels in parents of children with autism spectrum disorder. *Research In Developmental Disabilities*, 35(3), 686-695.
- Schat, A. C., Kelloway, E. K., & Desmarais, S. (2005). The Physical Health Questionnaire (PHQ): construct validation of a self-report scale of somatic symptoms. *Journal of Occupational Health Psychology*, 10(4), 363.
- Scorgie K., Wilgosh L. & McDonald L. (1998) Stress and coping in families of children with disabilities: An examination of recent literature. *Developmental Disabilities Bulletin*, 26, 23-39.
- Seeman, M., & Lewis, S. (1995). Powerlessness, health and mortality: A longitudinal study of older men and mature women. *Social science & medicine*, 41(4), 517-525.
- Seltzer, M. M., Greenberg, J. S., Floyd, F. J., Pettee, Y., & Hong, J. (2001). Life course impacts of parenting a child with a disability. *Journal Information*, 106(3).
- Shattuck, P. T., Wagner, M., Narendorf, S., Sterzing, P., & Hensley, M. (2011). Post-high school service use among young adults with an autism spectrum disorder. *Archives of pediatrics & adolescent medicine*, 165(2), 141-146.
- Sherwood, A., Blumenthal, J. A., Trivedi, R., Johnson, K. S., O'Connor, C. M., Adams, K. F., ... & Hinderliter, A. L. (2007). Relationship of depression to death or hospitalization in patients with heart failure. *Archives of Internal Medicine*, 167(4), 367-373.
- Singer, L., & Farkas, K. J. (1989). The impact of infant disability on maternal perception of stress. *Family Relations*, 444-449.
- Sipal, R., Schuengel, C., Voorman, J., Van Eck, M., & Becher, J.(2010). Course of behaviour problems of children with cerebral palsy: the role of parental stress and support. *Child: care, health and development*, 36(1), 74-84.
- Thurston, S., Paul, L, Loney, P., Ye, C., Wong, M. & Browne, G. (2011) Associations and costs of parental symptoms of psychiatric distress in a multi-diagnosis group of children with special needs. *Journal of Intellectual Disability Research*, 55, 263-280.
- Trute, B., Benzies, K. M., Worthington, C., Reddon, J. R., & Moore, M. (2010). Accentuate the positive to mitigate the negative: Mother psychological coping resources and family adjustment in childhood disability. *Journal of Intellectual and Developmental Disability*, 35(1), 36-43.
- Uchino, B. N. (2009). Understanding the links between social support and physical health: A life-span perspective with emphasis on the separability of perceived and received support. *Perspectives on Psychological Science*, 4(3), 236-255.

Vedhara, K., Cox, N., Wilcock, G., Perks, P., Hunt, M., Anderson, S. & Shanks, N. (1999).

Chronic stress in elderly carers of dementia patients and antibody response to influenza vaccination. *The Lancet*, 353(9153), 627-631.