Determinants of quality in child care: A review of the research evidence

Literature review

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Determinants of quality in child care: A review of the research evidence

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Executive summary

As the workforce participation of mothers with children of preschool age increased during and after the 1970s, there was concern regarding the effects of non-maternal care on children's development. As research yielded contradictory or controversial results, attention was focused on aspects of care that might significantly influence the consequences of care for children, especially the quantity and quality of care. This report reviews research on outcomes for children associated with child care of varying quality.

Definitions of quality in child care vary in accordance with the perspectives of stakeholders. Research has predominantly adopted a developmental perspective, where high quality care is defined as that which promotes optimal child outcomes in all domains of development, while low quality care is associated with negative outcomes for children.

In the measurement of quality, a distinction has been made between *structural quality*, which looks at aspects of the child care setting, and *process quality* – what actually happens in a child care setting, especially child-adult and child-child interactions and children's engagement with activities and materials made available for them. Instruments that attempt to assess these aspects of quality have been developed and widely used.

Much research has focused on aspects of child care that can be regulated – the ratio of the number of children per caregiver; group size; and caregiver education and/or training. While not totally consistent, the weight of evidence favours the following conclusions:

- Lower child-adult ratios (fewer children per caregiver) are associated with higher process quality; conversely, higher ratios are associated with lower process quality. The connection seems to be stronger for younger (ie infants) than older children (ie over three years).
- Larger group size is associated with lower process quality, but the connection is not as strong as for child-adult ratio.
- The most significant factor affecting quality appears to be caregiver education, qualifications and training – aspects of structural quality; and caregiver non-authoritarian beliefs on childrearing.

Stability of care, in the sense of low levels of staff turnover, is also associated with positive child outcomes.

The following child outcomes have been found to be associated with high quality care:

- better language and cognitive development and maths readiness
- better cooperation and compliance, fewer behavioural problems.

More research has been undertaken on centre-based than home-based (family day care, relative care) child care even though more children are in home-based care, and there is not enough evidence to enable a general comparison of the quality of these different care settings. However, recent research suggests more negative outcomes for very young children associated with centre-based than home-based care, except in the case of children from low-income families, where participation in centre-based programs appears to have some positive effects.

Generally, research on quality has yielded modest but significant effect sizes, and there is evidence in recent studies that some effects may be enduring.

While the quality of research over the past quarter-century has steadily improved, it has also been subjected to searching analysis and criticism, stimulating further improvement. There is reason to be more optimistic about the future 'quality of research on child care quality.'

At the same time, the difficulties involved in defining quality and studying child care arrangements that vary widely in quantity, in quality and across time for each particular child, have become more evident. Attention has shifted to generic 'early childhood programs', as the very encouraging long-term results of high-quality interventions (for example, the Perry Preschool Project, Head Start, the Abecedarian Project) become more widely known. Research into the effects of 'pre-Kindergarten' programs provided universally or for disadvantaged populations is flourishing. Consequently the identification of 'child care' per se in research reports has become less clear. Nevertheless the concept of quality in child care has been influential to the extent that governments have assumed increasing responsibility for regulating, monitoring and improving the quality of care.

1. Introduction

1.1 Review objectives

This report reviews research undertaken during the last quarter of a century relating to factors associated with, or determinants of, quality in child care and explores the following questions:

1. What are significant indicators of quality in child care, and how have they been measured?
2. What does research have to say about the outcomes for children of high quality as compared with low quality care?
3. What is the quality of research on child care quality?

A literature search was undertaken and the following resources were consulted: Current Contents Connect, Medline, Psychological and Behavioural Sciences Collection, PsycINFO, SOCIndex with Fulltext, AGIS Plus Test, APA-FT Australian Public Affairs Fulltext, Family & Society, Sociological Abstracts, Social Sciences Abstracts. Government and other reports were accessed through Google and Google Advanced Scholar, as were articles followed up from other sources. The cut-off date for the literature search was July 2007.

1.2 Definitions

'Child care' refers to arrangements for the care of children that have been variously categorized as non-maternal or non-parental care and include long day care in centres; home-based care in the child's own home or a caregiver's home; and, to an extent limited by lack of research, care by friends or relatives (sometimes called 'kith and kin' care).

This report examines research on child care quality, not on the effects of child care versus family care, nor the effects of amount of time spent in care. It also confines itself to a consideration of care for children below school age. Many children now experience out-of-school-hours care, but it deserves separate consideration as its history and purposes differ from pre-school care and its quality has thus far been less intensively researched.

1.3 Perspectives on quality

Child care quality has been described as a 'slippery and multifaceted construct that requires careful measurement and interpretation' (Hwang, Broberg & Lamb, 1991:117). Child care can be regarded as a service to parents; a way of enhancing children's development; and part of a broad range of services to children and parents. Farquhar (1990) noted three perspectives on quality: the child development perspective; the government or regulatory perspective; and the parent perspective. Layzer and Goodson (2006), Calvert (2004) and Da Silva and Wise (2006) identify the perspectives of parent, child and provider, while Fenech, Sumsion and Goodfellow (2006:50) stake out a claim for a staff perspective:

> *Equally important in our view are the contextual and adult-work environmental dimensions of quality such as staff wages, goal consensus, the exercising of autonomy to make professional judgments, workload and job satisfaction.*

Scarr (1998:100) exemplifies a child development perspective in her definition of high quality:

> *child care is [characterised by] warm, supportive interactions with adults in a safe, healthy and stimulating environment, where early education and trusting relationships combine to support individual children's physical, emotional, social and intellectual development.*

This developmental perspective has dominated research into connections between aspects of child care and of children's experiences in care, and their current and future wellbeing.

1.4 Historical perspective

In the last quarter of the twentieth century, the participation of women in the workforce increased markedly in Australia and other English-speaking countries. Among women in general, the highest rates of growth were experienced by women with children under school age (Brennan, 1998). Consequently non-maternal care of children, through both formal and informal arrangements, has become much more widespread.

As the number of mothers of very young children entering the workforce grew, so also did concern about the effects of non-maternal care on children. The negative effects of non-responsive institutionalisation had already been documented. The first major question was whether separation from mother in the very early years would lead to insecure attachment to mother and later psychological problems. Hence a great deal of child care research in the 1970s and 1980s focused on the connection between child care experience and attachment, especially as it related to children in the 0-3 age range (see Melhuish, 2004 for a summary). Other early research, since criticised for its methodological limitations, had contradictory results relating to cooperation and aggression among children in day care when compared to their home-reared peers.

By the late 1970s, researchers recognised that the quality of child care varied widely, and that there was evidence of an association between low quality care and risk of insecure attachment. It was also suggested that the effects of non-parental care experience might be mediated by the quality of care (Belsky, 1988; Clarke-Stewart, 1989; Lamb, Sternberg & Ketterlinus, 1992). There was a consequent need to define quality in child care settings; to develop objective indicators of quality; and to assess whether high quality care was beneficial, or low quality care harmful, to children's development. The first major study of quality in the US was the National Day Care Study (Ruopp, Travers, Glantz & Coelen, 1979). It opted to examine, as independent variables affecting the quality of a child's day care experience, 'characteristics of day care centers which were…subject to government regulation': principally staff/child ratio; size of child groupings; and caregiver qualifications. These and other characteristics of the child care setting and of caregivers have come to be labelled in subsequent research as indicators of *structural quality*. They are distinguished from *process quality*, which is measured by observing what actually occurs in child care settings, especially children's interactions with caregivers and with other children and their engagement with the activities and materials provided.

In the last decade, neuropsychological scientists have established links between early experiences and brain development in early childhood. It is now clear that brain development occurs during the first five years of life and the complexity, number and strength of neural pathways is a function of the quality and range of early experiences in interaction with genetic predisposition. Depending on the nature of these experiences children will be provided with 'sturdy or fragile' foundations for future development. Although the brain continues to make new connections throughout life, new learning does not take place with the same rapidity as it does during early childhood. As increasing numbers of children enter centre based care this research has added scientific credibility, and weight, to the call to ensure that children's early experiences are positive ones (Shonkoff & Phillips, 2000).

1.5 Measures of child care quality

Instruments were developed to measure quality, the majority falling into two categories:

Aspects of the child care setting.

The most widely used of these have been the Early Childhood Environment Rating Scale (ECERS: Harms & Clifford, 1980), its revised version (ECERS-R: Harms, Clifford & Cryern 1998), and similar scales adopted for infant classrooms (ITERS: Harms, Cryer & Clifford, 1990) and for home (or family day care) settings (FDCRS: Harms & Clifford, 1989). These measure the quality of the physical setting, curriculum, caregiver-child interactions, health, safety, scheduling of time, indoor and outdoor play spaces, teacher qualifications, play materials, centre administration, and meeting staff needs.

Interactions between caregivers and children.

Prominent among these have been the CIS (Caregiver Interaction Scale) and the Arnett Scale of Caregiver Behaviour (Arnett, 1989); and ORCE (Observational Record of the Caregiving Environment), which was developed for use in the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care, one of the largest studies and most intensive studies of day care. It has followed 1300 children drawn from 10 sites in the US longitudinally from birth (NICHD Early Child Care Research Network, 2005a).

2. Research on 'regulable' aspects of quality

Caregiver education, caregiver specialised training, child-adult ratios and group size are relatively easy to document or to measure and are commonly the subject of recommended or prescribed standards in child care regulation or accreditation. They have been widely accepted as indicators of structural quality, serving as independent variables linked to global quality scores on instruments such as those listed above, or to process quality. Many studies since 1979 have looked at links between measured quality and child adult ratio, group size, and the qualifications and training of caregivers. Results of associated research are summarised in this section.

2.1 Child adult ratio

There are various ways in which to calculate the ratio of children to adults in a child care setting. The most accurate measure for research purposes, and one that is most commonly used in research studies, is the total number of staff and children observed in the same area over a given period of time.

Findings can be summarised as follows:

Lower ratios (a smaller number of children per caregiver) have been associated with:

- *Higher global quality scores* (Goelman, Dohert, Lero et al., 2000; Blau, 2000; Burchinal, Roberts, Nabors, et al., 1996; Burchinal et al., 2000; Cryer, Tietze, Burchinal et al., 1999; Howes, Whitebook & Phillips, 1992; Phillips, Mekos, Scarr et al., 2000; Phillipsen, Burchinal, Howes et al., 1997; Scarr, Eisenberg & Deater-Deckard., 1994)
- *Higher process quality* (Rao, Koong, Kwong & Wong, 2003; Vandell & Powers, 1983; Gevers, Deynoot-Schaub & Ricksen-Walraven, 2005; Ghazvini & Mullis, 2002; Palmerus & Hagglund, 1991; Volling & Feagans, 1995; Blau, 2000; de Schipper, Riksen-Walraven & Geurts, 2006; Phillipsen, Burchinal, Howes & Cryer, 1997; Ruopp et al., 1979; Howes & Rubenstein, 1985; Elicker et al., 1999; NICHD, 1996; 2000b; McCartney, Scarr, Rocheleau et al., 1997; Scarr, Eisenberg & Deater-Deckard, 1994; Whitebook, Howes & Phillips, 1989; 1990; Palmerus, 1996; Palmerus & Hagglund, 1991; Leach, Barnes, Malmberg, Sylva, Stein, & the FCCC team, under review).
- *Better child outcomes* (Howes et al., 1995; Ruopp, Travers, Glatz et al., 1979; Burchinal et al., 1996; Howes, 1997; Vernon-Feagans, Emanuel & Blood, 1997; Love et al., 2003; Sagi, Koren-Karie, Gini et al., 2002; Holloway & Reichart-Erickson, 1998; Volling & Fegans, 1995; Sylva et al., 2004).
- Conversely, higher ratios (a large number of children per caregiver) have been associated with lower levels of process quality (Burchinal, Roberts, Nabors, et al., 1996; Burchinal, Roberts, Riggins et al., 2000; Burchinal, Howes & Kontos, 2002; Vandell & Powers, 1983; Volling & Feagans, 1995; Rao, Koong, Kwon et al., 2003.)

While there have been some studies with contradictory results (Dunn, Beach & Kontos, [1994] and Holloway & Reichhart-Erickson (1988) found no relationship between child-adult ratio and other indicators of quality), the weight of evidence favours a conclusion that child-adult ratio in a child care setting is significantly associated with quality.

This research is limited, however, in two major respects:

1. Most studies have examined the effects of child-adult ratios on the quality of care for children aged three to five years; but there is evidence that the ratio is a stronger predictor of quality for infants and toddlers than for older children (Hayes Palmer & Zaslow, 1990; Cleveland, Forer, Hyatt et al., 2007; de Schipper, Riksen-Walraven & Geurts, 2006).

2. More substantially, studies up until recently have been almost exclusively correlational. Only five experimental studies have been found, three of them being what can be termed 'natural experiments' where process quality before and after a change in ratio have been reported. Smith, McMillan, Kennedy et al. (1989) did not find significant differences in process quality before and after an improvement in the child-adult ratio in four classrooms for three to five year old children. Howes et al. (1995) found a reduction from 6:1 to 4:1 for infants and 8:1 to 6:1 for toddlers improved the global quality of care. Palmerus (1996) found child-initiated verbal interactions with caregivers decreased while caregiver-initiated interactions – which he concluded were used for control purposes – increased when the ratios increased from 2.2:1 to 4.2:1.

In the two experimental studies where ratios were deliberately varied and results compared, Love, Ryder & Faddis (1992) found a moderate negative change in ratio had no significant effect on caregiver or child behaviour. De Schipper, Riksen-Walraven & Guerts (2006) observed 217 caregivers each interacting in a play situation with a group of three children, compared with the same caregiver interacting with the same group plus two additional children – hence, a ratio of 3:1 compared with 5:1. They found that caregivers were significantly more supportive and more respectful of children's autonomy in the 3:1 setting, while children were significantly more cooperative – the difference being more marked for younger children, for whom caregivers provided better structure and limits and higher quality instructions, with less negative regard. Younger children in particular showed significantly higher levels of wellbeing in the smaller groups.

The authors conclude that strong conclusions with regard to ratios significant for older children cannot be drawn from their data. Differences between the groups, though significant, were relatively small – a characteristic of 'effect size' that has commonly been found in child care quality research. Phillipsen and colleagues (1997) found a much larger increase in measured quality when very unfavourable ratios were improved than when already favourable ratios were improved by a similar proportion, suggesting a 'law of diminishing returns', where a slight improvement in ratios may be judged not to be warranted in terms of quality improvement.

However, De Schipper et al. (2006) argue that small differences can be psychologically meaningful when they mark the difference between adequate versus inadequate care for substantial numbers of children. They gave the example of 'supportive presence of caregiver', where the difference between the 1:3 and 1:5 ratios was 1 scale point for the youngest children – 3.5 and 4.5 respectively. A rating of 3 is stated to reflect an inadequate level of support, while 4 is marginally adequate but still less than desirable. The results therefore lie on either side of the threshold between a measure of adequate and inadequate care. To further illustrate the significance of this point, they note that the number of children in their study receiving inadequate support rose from 36 (12 caregivers x 3 children per caregiver) in the 1:3 situation to 120 (24 caregivers x 5 children per caregiver) in the 1:5. They also note that in Sagi, Koren-Karie, Gini et al. (2002) found a cut-off of 1:3 versus larger ratios made a significant difference regarding the likelihood of infants being securely or insecurely attached to their mothers. This evidence is also consistent with Clarke-Stewart, Gruber and Fitzgerald's (1994) finding that children receive less attention, affection, responsiveness and stimulation from caregivers each time a single child is added to a group.

2.2 Group size

Regulations generally prescribe the maximum number of children arranged and supervised as a group, and this varies according to age, with group size for younger children being smaller.

Research findings relating to group size are summarised as follows:

- Where the number of children in a group was of the recommended size or below, process quality was higher (Ruopp et al., 1979; Howes & Rubenstein, 1986; Elicker et al., 1999; NICHD, 1998, 2000; Burchinal, Howes & Kontos, 2002; Clarke-Stewart, Vandell, Burchinal, et al., 2002; Clarke-Dunn, 1993; Holloway & Reichhart-Erickson, 1988; Volling & Feagans, 1995; Stith & Davis, 1984).
- Burchinal et al. (1996; 2000) found poorer process quality where group sizes were large.
- Group size has not been found to be significantly associated with other quality indicators (Blau, 2000; Dunn et al., 1994; Howes et al.,1992; Whitebook, Howes & Phillips, 1989; Raspa McWilliam and Ridley, 2001) and Layzer and Goodson (2006) noted that findings were inconsistent, with little attention being paid to the age mixing of children (which is often seen in home-based, family or relative child care). Galinsky, Howes, Kontos et al. (1994) found home caregivers caring for three to six children provided higher quality care than those caring for one or two, although contrary findings have been reported in several other studies (Kontos, Howes, Shinn et al., 1995; NICHD, 1995).

While group size appears to be less significant than other structural variables, its impact is difficult to tease out as research on this variable is often combined with others eg staff qualifications and training or child-adult ratio (Munton, Mooney, Moss et al., 2002; Fiene, 2002).

2.3 Caregiver education, qualifications and training

Among staff working in child care settings, type and level of education, qualifications and training vary widely. Staff can be categorised according to the following criteria:

- Level of formal education attained: high school, post-high school, TAFE, University degree
- Degree of specialisation: whether educational attainments are general, other specialist or early childhood
- Training: whether pre-service, on-the-job or continuing.

Other types of classification are possible and will vary from one location to another, and distinctions between terms used in research reports are not consistent.

Setting aside these difficulties of definition: the link between levels of caregiver education and/or specialised qualifications, process quality and child outcomes is perhaps the strongest in research on quality (Burchinal, Cryer, Clifford & Howes, 2002; Howes, 1997; NICHD Early Child Care Research Network, 1996; Phillips, Mekos, Scarr, McCartney & Abbott-Shim, 2000; Phillipsen, Burchinal, Howes & Cryer, 1997; Whitebook, Howes & Phillips, 1990; Riley, Roach, Adams & Edie, 2005; Clarke-Stewart, Vandell, Burchinal, et al., 2002; Arnett, 1989; Berk,1985; Blau, 2000; Burchina,l Howes & Kontos, 1999; Burchinal, Roberts, Riggins et al., 2000; Howes & Smith, 1995; Howes, Whitebook & Phillips, 1992; Lutcovich, Fiene, Johnson et al., 1997; Vandell & Wolfe, 2000; Stallings & Porter, 1980; Vandell & Powers, 1983; Bordin, Machida & Varnell, 2000; Loeb, Fuller,Kagan et al., 2004).

Burchinal, Howes and Kontos (2002) conclude that caregiver level of education is a better predictor of quality than group size or adult-child ratio. This appears to apply in both centre and home-based care, although the correlation is less clear in the case of home care (Layzer & Goodson, 2006). The level of caregiver formal education is a stronger predictor for children of preschool age than for younger children (NICHD, 2000a), while specialised training is more strongly associated with quality in the case of infants and toddlers (Howes, Whitebook & Phillips, 1992). Caregivers with a higher level of formal education had more specialised child-related training, held less authoritarian child-rearing beliefs, and were in settings rated as more safe, clean and stimulating (NICHD, 2000a). However, a recent large-scale statistical re-analysis of data from Head Start programs found no statistically significant impacts of teacher education on pre-reading or maths skills (Early et al., 2007).

Generally, positive caregiving for infants was associated with smaller group size, child-adult ratios, non-authoritarian beliefs about childrearing, and a safe, clean and stimulating environment – all but one of these being aspects of structural quality (NICHD, 2000a). Looking at recommended standards formulated by the American Public Health Association and the American Academy of Pediatrics in 1991, NICHD (1999) found that outcomes for children were better when the recommended child-staff ratio was met at 24 months, and recommended levels of caregiver training and education were met at 36 months; the more standards met, the better the outcomes in terms of school readiness, language comprehension and behaviour problems at 36 months.

2.4 Stability, staff turnover and staff wages

Stability in care has been found to be strongly and consistently positively related to child outcomes (Loeb, Fuller et al., 2004). High staff turnover is associated with lower quality service and poorer child outcomes (Helburn, 1995; Howes & Hamilton, 1993; Howes, Whitebook & Phillips, 1992; Phillips, Mekos, Scarr et al., 2000; Love, Harrison, Sagi-Schwarz et al., 2003; Manlove & Guzell, 1997). Children enrolled in fewer care arrangements showed less internalising behaviour and more well-being (de Schipper, van Ijzendoon & Tavecchio, 2004). A large-scale longitudinal study of the impact of multiple care arrangements on children's development is currently being undertaken in Australia (Bowes, Harrison, Wise et al., 2004).

Staff turnover is consistently high across studies of child care in various countries (including Australia), somewhere between 30 and 50% annually (Fenech, Sumsion & Goodfellow, 2006; Smith, 2004; Vandell & Wolfe, 2000) and roughly three times the level of teacher turnover in primary schools (Whitebook, Phillips, Bellm et al., 2004). This is often linked to the low wage levels typically found among workers in child care (Smith, 2004; Blau & Mocan, 2002; Phillips et al., 2000; Whitebook & Bellm, 1999).

Vandell and Wolfe (2000) quote figures indicating a decline in the educational background and training of child care staff during the 1990s and suggest that this may be related to low wages. Phillipsen et al. (1997) found that staff wages were strongly related to process quality; Goelman, Doherty, Lero et al. (2000) found that while an observed staff member's level of early childhood care and education-specific education was the strongest combined direct/indirect predictor of quality, the strongest direct predictor was the observed staff member's wages. Munton, Mooney, Moss et al. (2002) conclude that the influence of child:adult ratios and group size cannot be considered independently of staff education and training.

2.5 Physical aspects of the child care setting: a gap in research

In an analysis of outcome measures in 65 studies published between 1979 and 2005 Zaslow, Halle, Martin et al. (2006) found that only a minimal number of studies (5%) paid attention to physical well-being and motor development. With respect to the physical environment NICHD (1996) found a significant association between positive caregiving behaviours and characteristics of the physical environment. They suggest that the importance of the physical environment should not be underestimated, implying that it has been. Maxwell (2007) found that the quality of the physical environment related to measures of self-perceived competence in children, especially three year olds.

Apart from these studies, research appears to provide little or no guidance regarding the appropriateness of current regulations regarding space requirements. This scant focus on physical well-being and motor development was unexpected given that a 'strong theme' in the ECERS is its focus on health and hygiene practices and its items related to space and the physical setting, and current concerns about children's levels of fitness and childhood obesity levels.

3. Measuring child outcomes

3.1 Introduction

Research on children's development as related to the quality of care they receive often studies the link between structural and/or process aspects of quality and measured outcomes. Children have been found to perform better on tests of language and cognitive development and maths readiness where caregiver level of education – an aspect of structural quality – is high (Clarke-Stewart, Vandell, Burchinal et al., 2002; Vernon-Feagans, Emanuel & Blood, 1997; Howes, 1997; Dunn et al., 1994). Loeb et al. (2004) found there are more child social problems where the caregivers' level of education is lower.

The NICHD Early Child Care Research Network (2002) found that the relation between caregiver training and child-staff ratio on the one hand, and children's cognitive and social competence on the other, was mediated by *process* quality – that is, higher scores on structural predictors were associated with higher levels of process quality which were, in turn, associated with children's greater cognitive and social competence (Schliecker, White & Jacobs, 1991; Marshall, 2004).

Structural quality does not *necessarily* imply quality of process, however: in a study of 120 US centres only one of six regulable characteristics – the highest wage paid – was significantly associated with observed process quality (Scarr, Eisenberg & Deater-Deckard, 1994). It is argued that structural variables are more appropriately thought of as *inputs* to, or possible predictors of, quality rather than indicators of quality themselves (Blau & Mocan, 2002; Layzer & Goodson, 2006).

The NICHD Study found that the observed quality of care was a consistent predictor of child outcomes during the first years of life, with the language stimulation provided by the caregiver – a process variable – being positively related to children's performance on measures of cognitive and linguistic abilities at ages 15, 24 and 36 months. Process quality during the first three years of life was related to children's pre-academic skills of expressive and receptive language at age three (NICHD Early Child Care Research Network, 2000b).

3.2 Socio-emotional and behavioural outcomes

With respect to infant-mother attachment, NICHD (1997) found that poor quality care apparently added to the risks inherent in poor mothering. Children in high-quality centres were rated as being more cooperative and compliant and having fewer behavioural problems (Clarke-Stewart, Vandell, Burchinal.et al., 2002; Howes & Olenick, 1986; Howes, 1990; Beller, Stahnke, Butz et al., 1996). Melhuish, Sylva, Sammons et al. (2001) found that high quality care reduced the incidence of behaviour problems among two to three year olds, while Volling and Feagans (1995) found that socially withdrawn infants developed better peer relations in high quality centres but deteriorated if put in centres with low quality care. Rosenthal (1999) found that aspects of care quality were associated with the frequency of aggressive interactions, while Vandell and Corasaniti (1990), controlling for background factors, found that children from lower quality centres were less socially competent. Improvements in quality were associated with improvements in peer interactions (Howes, Smith & Galinsky, 1995).

NICHD's analyses of findings related to compliance and problem behaviour (1998) provided some support for the importance of quality as related to aggression and non-compliance: there was evidence that higher quality predicted fewer mother- and caregiver-reported problems and more mother-reported social competence at two, and more observed compliance with mothers and fewer caregiver-reported problems at age three.

3.3 Cognitive, language and pre-mathematical skills

Numerous studies have found an association between quality of care and children's language and cognitive development (Howes, 1997; Schliecker, White & Jacobs, 1991; Burchinal, Roberts, Nabors & Bryant, 1996; Burchinal, Roberts, Riggins et al., 2000; Peisner-Feinberg & Burchinal, 1997; NICHD, 2002; Bryant, Maxwell, Taylor et al., 2003; Kontos & Fiene, 1987; Phillips, Scarr & McCartney, 1987; Schieckler, White & Jacobs, 1991; Clarke-Stewart, Vandell, Burchinal M et al., 2002). The Child Quality Outcomes (CQO) study found that children enrolled in higher-quality centres as preschoolers had better maths skills through to second grade (Lamb, 1998; Love, Schochet & Meckstroth, 1996). At 4 ½ years of age, children who had received child care rated in the highest tercile scored higher on tests of pre-academic skills and language performance than those whose child care quality rated at the bottom. Effect sizes of 27% and 17% were as high as those relating to parenting quality and poverty (NICHD, 2002).

There is some evidence that receiving high quality care may reduce or even eliminate negative outcomes found in some studies. Research by Anderssen in Sweden (1989) has found no evidence of day care effects in longitudinal studies, and Melhuish (2004) suggests this may be because of the generally high quality of Swedish centres.

4. Other aspects of quality

4.1 Quality and the child care setting

Although the majority of children in non-maternal care are in some form of home care, most research has been carried out in centres. There is relatively little evidence regarding differences in quality between home-based and centre-based care: while some negative aspects and outcomes of 'kith and kin' providers have been found, these relate to disadvantaged populations (Loeb, Fuller, Kagan et al., 2004; Leach, Barnes, Malmberg et al., under review). In other samples there is evidence that quality of care may be higher in home-based care for infants and toddlers: NICHD (2000a) found the lowest levels of positive caregiving for infants at six months were in centres, and that centres had larger group size and higher child-adult ratios despite having the most highly trained and specialised caregivers. By 18 months the gap between centres and home-based care was narrowing and by 36 months discrepancies in ratings had diminished.

Similar results were found by Leach, Barnes, Malberg et al. (under review) and Melhuish, Mooney, Martin et al. (1990): there was less antisocial behaviour among children observed at 10 and 18 months where they were in the care of relatives as compared with childminders or nurseries/centres, and children in nurseries showed poorer language development than those in other types of care. Children in home-based care were more aggressive than those staying with 'kith and kin' members (Loeb, Fuller, Kagan et al. (2004). Nursery care rated significantly lower than childminders, relatives or nannies on measures of quality, even including safety and health measures, and this applied irrespective of the cost of nurseries. (Leach, Barnes, Malberg et al., under review). On the other hand, children in individual day care were rated as not as socially competent as children who had been in group day care (Love, Harrison, Sagi-Schwarz et al., 2003). Wessels, Lam and Hwang (1996) and Loeb, Fuller, Kagan et al. (2004) found a strong relationship between cognitive development and participation in centre-based programs among children from low-income families. For all children in forms of preschool care, centre-based child care mixed with grandparent care was associated with better developmental outcomes than any other combination of care arrangements.

Melhuish (2004) notes that when parental leave was extended in Sweden parents 'voted with their feet' and the use of child care in the first 18 months of life decreased dramatically. Consequently, the quality of child care in the first 18 months is a relatively unimportant issue in Sweden.

4.2 Durability of child outcomes associated with quality

There is little longitudinal research on child care for the general population that traces outcomes for older children, the exception being the NICHD Study, which is now publishing results for children at 9 years of age. The authors consider that determination of links between early child care and children's development by third grade is particularly important because levels of achievement and social adjustment formed by this stage are highly stable thereafter (Entwisle & Alexander, 1999; Rutter & Maughan, 2002). They found that higher-quality child care continued to be linked to higher scores in maths, reading and memory. They also noted the relative independence of quality, quantity and type of child care in relation to child developmental outcomes.

A longitudinal Swedish study also showed that high structural quality predicted higher-level math ability at age eight, an effect not evident in analyses at 40 months – an intriguing suggestion of a 'sleeper' effect (Broberg, Wessels, Lamb et al.,1997). NICHD (2005b) also found evidence of potential sleeper effects in their nine-year analysis, but these related to quantity rather than quality of care.

While effect sizes of child care quality are generally modest, they are significant (Burchinal, Howes & Kontos, 2002; Peisner-Feinberg & Burchinal, 1997; NICHD, 2002). NICHD (2002) concluded that effect sizes for quality were as large as the effect size for parenting quality and poverty, and others found that effects were larger for children from low-income families (Loeb, Fuller, Kagan et al., 2004; Magnuson, Meyers, Ruhm et al., 2004; Gormley et al., 2005). Generally the weight of evidence supports Vandell and Wolfe's conclusion, on the basis of their review of research on child care quality in 2000, that 'quality matters'.

5. Child care, early childhood education and the concept of pre-kindergarten

Much interest in the potential of child care as an intervention strategy to improve the lives and development of children living in deprived circumstances has been generated as a result of strong evidence from high-quality randomised control projects (the Perry Preschool Project; Abecedarian Project; project CARE; the Milwaukee Project; Infant Health and Development Project; Early Head Start) and quasi-experimental programs (Head Start; Chicago Child Parent Centres, Syracuse and Brookline). Galinsky (2006) and Gormley (2007) provide a summary of findings.

Starting in the 1960s, these projects were mostly designed for children from highly disadvantaged families, and rigorous follow up studies have shown a consistent pattern of results, with evidence of cost-effectiveness that continues to increase over the years and far outweighs the original cost of the programs. Results apply whether the programs started in infancy or when children were three years of age; and recent research indicates that early interventions are more cost effective than interventions later in life, for example in school (Carneiro & Heckman, 2003).

These very encouraging results prompted further research on whether children from poor families gain a special benefit from high-quality child care experiences; or – conversely – whether they are detrimentally affected by poor quality care. A high level of variability in the quality of care available to poor families makes it difficult to generalise from evaluations of high-quality demonstration programs; but there is other evidence that quality child care may be more important for identifiable subgroups of children who are at risk for poor outcomes because of unfavourable family environments.

Loeb et al. (2004) found a strong, significant and positive association between sensitive and responsive caregiving and the cognitive development of children from low-income families in centres as compared with 'kith and kin' care, and fewer child social problems when caregivers were more educated. NICHD and Duncan (2003) reported findings that children from low-income families in centre care had more advanced language development and performed better on measures of IQ and achievement than similar children in home-based care. Child care quality affects pre-reading, cognitive and problem behaviours more if children are disadvantaged (NICHD & Duncan, 2003; Peisner-Feinberg & Burchinal, 1997). While Kontos and Fiene (1987) reported no association when selection factors were taken into account in their study of children from poor families, in a large study examining the influence of child care quality and the extent of care on low income children aged two to four, Votruba-Drzal, Coley and Chase-Lansdale (2004) found modest associations between child care quality and improvements in children's socio-emotional development. They concluded that quality may be particularly salient for subgroups of children from low-income families, and recommend the development of effective interventions that are tailored to their needs.

For these and other reasons, interest in the provision of some form of preschool educational experience has intensified in both the United States and the United Kingdom. By 2004-5 state governments in the United States were spending US $3 billion a year on what have come to be called pre-K programs, and two-thirds of US children, mainly four-year-olds but some younger, were attending some kind of pre-kindergarten program (Barnett, Lamy & Jung, 2005).

The UK Childcare Act 2006, Section 7, states as a 'duty' the obligation of local authorities to secure 'a free minimum amount of early learning and care for all 3 and 4 year olds whose parents want it'. While many state pre-kindergarten programs are targeted to disadvantaged children, others, such as Oklahoma, make such programs universally available. The first Oklahoma evaluation found strong effects on cognitive and language development for deprived children, with much weaker effects for advantaged children (Gormley & Gayer, 2005). Their second evaluation, using national test-normed data, found positive effects for all children, regardless of socioeconomic status or ethnicity (Gormley, Gayer, Phillips et al., 2005). Barnett et al. (2005) found substantial gains in pre-reading and pre-math skills from pre-K programs in five states. The EPPE (Effective Provision of Preschool Education) study of the effects of preschool education in the United Kingdom found that disadvantaged children in particular benefited significantly from good quality preschool experiences, especially if groups contained a mixture of children from different social backgrounds (Sammons et al., 2003a, 2003b).

As research into the effectiveness of pre-kindergarten programs in relation to school readiness and cognitive development flourishes, the most recent review of the field (Gormley, 2007) refers collectively to ECCE – early childhood care and education – incorporating research relating to:

- *Child care* – regularly scheduled non-parental care for children of diverse ages;
- *Head Start* – a federally funded program for disadvantaged and disabled four-year-olds that provides a variety of services to child and family;
- *Pre-Kindergarten* – an educational program funded by the state government;
- *Early Childhood Demonstration Programs* – relatively expensive experimental interventions.

In an article provocatively entitled 'Farewell to Childcare?' Peter Moss of the Thomas Coram Research Unit in London argues that England has started a process of change from a fragmented 'childcare discourse' to an integrated and holistic 'pedagogical discourse' (Moss, 2006). He argues that childcare is increasingly inadequate and outdated as a concept. However, as the distinction in research reports between child care and early education becomes increasingly blurred, Moss and others do not discuss the question of whether and how child care and education are – or could be – integrated with, complementary to, or run separately from each other.

6. Improvements in research design and methodology

6.1 Measuring quality: recent developments

Since Vandell & Wolfe's report noted problems in research methodology, such as the need to control for selection bias and the non-randomisation of study samples, the field has been subjected to further critical examination, new instruments trialled, and suggestions made for improvement. For example:

- A number of weaknesses have been identified in the ECERS and its offshoots (Dickinson, 2002; Cassidy, Hestenes, Hansen et al., 2005; Layzer & Goodson, 2006; Perlman, Zellman & Le, 2004), and newer, improved measures of the child care environment devised (Bradley, Caldwell & Corwyn, 2003; Moore, Gugiyama & O'Donnell, 2003; Maxwell, 2007; Goodson, Layzer & Layzer, 2005).
- The measurement of process variables that might be significant for the development of children's readiness for school has been undertaken (Layer & Goodson, 2006).
- Interest is being shown in the measurement of children's cortisol levels, based on findings that increased levels, indicative of increased stress, are more likely, and larger, as the quality of care decreases (Dettling, Parker, Lane, et al., 2000; Bruce, Davis & Gunnar, 2002).
- Global measures of quality in group care are criticized as obscuring intra-group differences in the attention received by children, and possibly understating the relationship between quality and outcome (Malerba, 2005; Layzer & Goodson, 2006). The need for greater clarity in distinguishing between aspects of process quality – for example, positive reciprocal social engagement – and outcome – enduring features of a child's social development – has also been pointed out (Zaslow Halle Martin et al., 2006).

6.2 Addressing problems of selection bias, omitted variables, and non-experimental research

It is often pointed out that the type and quality of child care are related to demographic and family factors that predict child outcomes, in that children from more advantaged families are more likely to experience centre-based child care as well as higher quality home-based care (Blau, 1999; Peisner-Feinberg & Burcinal, 1997; NICHD, 2000b; NICHD & Duncan, 2003), while children exposed to risk factors at home may be more likely to be placed in poorer quality home-based settings or centres (Belsky, Spritz & Crnic, 1996; Tresch, Owen & Cox, 1988; Phillips, Voran, Kisker et al., 1994). Hence effects ascribed to child care quality may actually be artifacts of family characteristics that are confounded with child care quality.

While the NICHD studies control for a wide range of selection factors, Besharov and Morrow (2006) state that they are not immune from problems encountered by most non-experimental studies, especially the 'omitted-variables' problem. Duncan & Gibson-Davis (2006) suggest a number of ways to reduce the biases inherent in non-experimental research (pages 546-547). They also point to the need to address the attrition suffered in virtually all longitudinal surveys and to take measures to adjust for any bias introduced into results as a result of this attrition. Methods for addressing concerns raised by Duncan and Gibson-Davis have been devised by Loeb, Fuller, Kagan et al. (2004); Gormley, Gayer, Phillips & Dawson (2005); Ludwig & Miller; Currie & Thomas (1995; 1999); Garces, Thomas & Currie (2002); and Hill, Waldfogel, Brooks-Gunn et al. (2005). Increasingly rigorous controls for selection bias are being applied in NICHD analyses (NICHD, 2003).

6.3 Greater reliance on longitudinal rather than cross-sectional studies

Child care quality is more frequently being investigated as part of large-scale prospective longitudinal studies, rather than with small samples comparing children differing in the variable under consideration (day care quality) which give a 'one-time' snapshot picture of what is happening and miss important features of the day care experience (for example length of time in care; other experiences in care; caregiver turnover). Examples of longitudinal studies include the NICHD sample; the EPPE project in the UK which includes over 3000 children; the Families, Children and Child Care (FCCC) study with 1201 children, also in the UK, and many other large-scale studies in the US. The Longitudinal Study of Australian Children (LSAC), commenced in 2004, is collecting data about child care arrangements and aspects of care that may be relevant to considerations of quality in future research.

6.4 New ways of introducing randomisation and experimentation

Given ethical and practical difficulties in randomizing individuals into different types of child care, and the opportunities presented by large-scale projects, St Pierre and Rossi (2006) call for randomization at group or site levels: comparing programs by randomly assigning classrooms or sites to experimental or existing (control) conditions. This form of randomization was used in the EPPE UK Study; in a search for a statewide system of rating child care quality (Riley, Roach, Adams et al., 2005); in the PCER project curriculum evaluation research (Besharov & Morrow 2006: 550); and in Smart Start evaluations (Bryant, Maxwell, Taylor et al., 2003).

6.5 Improvements in the definition and measurement of outcomes

Zaslow et al (2006) have proposed a comprehensive set of criticisms and suggestions for improvement in relation to the measurement of outcomes. A trend towards more precise definition of important aspects of children's development as dependent variables to be studied in research on child care quality is evident. While traditionally outcomes have been organized within rather broad domains (socioemotional, cognitive, physical or motor development) there now seems to be an increasing focus on 'school readiness' as a framework within which outcomes are defined. Hence efforts are being made to measure children's pre-mathematical, pre-literacy and language skills as they are related to child care quality. In research on longer-term outcomes, children's school achievement may be linked back to measures of structural and process quality to ascertain whether they are significantly related. It has also been suggested that measures of task engagement, motivation, enthusiasm and task persistence might usefully link aspects of the child care setting with longer-term outcomes.

Those who stress the importance of the quality of the care experience per se express concern about the growing emphasis on school readiness, fearing a too-early 'institutionalising' of children and a narrowing of perspective and practice to meet standards of accountability. Their goal is to enhance the development of 'the whole child', to enrich children's experiences in the here and now, believing that maximizing structural and process quality in care settings will promote children's current wellbeing and have positive effects on all domains of future development – effects that should be demonstrable in the longer term as research linking inputs to outcomes improves. Influences of these divergent points of view on the direction of future research on child care quality are yet to be played out.

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