Increasing father involvement in the care of their infant using text messages: The DadRocks study

Allison Flynn-Bowman

Submitted in partial fulfillment of the requirements for the degree of

Master of Science in Applied Health Sciences (Health Sciences)

Faculty of Applied Health Sciences, Brock University St. Catharines, Ontario

September 4, 2019
Abstract

Studies have shown that interventions aimed at the transition to fatherhood can have benefits to fathers. Yet there are few studies specifically designed for fathers at their transition to parenthood, despite fathers having asked for resources specifically tailored for them. DadRocks is a minimalist (i.e., low-cost) intervention that uses text messages to address fathers as they transition to fatherhood. DadRocks has been successfully piloted with Vietnamese fathers, but not in a Western sample of fathers. In our pilot of DadRocks with Canadian fathers, SMS messages were sent to seventeen fathers 3-5 times a week. Messages provided developmentally appropriate information such as games to play with their infants, milestones to observe and links to credible websites for information.

Fathers who had more positive attitudes towards father-infant relationship reported significantly more father-infant interaction. Father-infant interaction, especially play, increased between baseline, three months and six months. Fathers who reported more engagement with the messages had significantly more positive attitude and more affectionate behavior. First-time fathers felt most supported by the texts. Fathers with greater anxiety also reported using more recommended resources. Fathers generally liked the intervention, and provided suggestions for future messages. Our pilot data support the development of a more comprehensive experimental study of DadRocks, with a large community sample that could help determine the extent to which this low-cost intervention can improve father-infant relationships. Overall, our data suggest that text messages may be a low-cost way to communicate with fathers in ways that promote and support positive paternal care.
The DadRocks Study

Acknowledgements

My experience as a Brock MA student has been exceptional, and I want to thank some of the people who have made it possible.

To my supervisor Lynn, thank you for all you have taught me about fathers, research, statistics, and about being a compassionate and caring person. Your ability to go above and beyond for your students is great and I will be forever grateful for that. Thank you for your patience and expertise on this journey!

To Sheila, I am so appreciative of you and your nurturing my passion to translate knowledge. Thank you for all the ways you tell the story, and all of the ways you have translated your passion to me.

Tony, thank you for providing your valuable insight as a researcher from another department, and as a father. Having your perspectives really helped.

To the other faculty and staff at Brock who have helped me along this journey, thank you. I was able to take this learning well beyond just the class room and learn skills that will help through my future.

To my family, thank you for your patience with me as we went through this journey. To my kids Flynn and Hannah, and my husband Phil – thank you for all you have taught me about being a mom, partner, and better person. To my parents, and my in laws – thank you for all the work you have done to make this MA possible.

To you, reading this. I expect there will only be a few that do, but I am glad you found this thesis, and hope it helps on your knowledge journey.
The DadRocks Study

Abstract .................................................................................................................................................. i
Acknowledgements ................................................................................................................................. ii
Study Definitions ......................................................................................................................................... 1
Summary ...................................................................................................................................................... 2
Chapter 1: Introduction .................................................................................................................................. 5
   Father involvement at the transition to parenting................................................................................... 5
   Benefits on Cognitive Development .................................................................................................... 5
   Benefits on Social Development ......................................................................................................... 6
   Benefits on Physical Development .................................................................................................. 7
   Benefits to Mothers .......................................................................................................................... 7
   Benefits to Fathers ............................................................................................................................ 8
   Benefits to the Co-parenting Team .................................................................................................. 9
   Types of families ............................................................................................................................... 11
   Mental Health ........................................................................................................................................ 11
   Absence and stress .......................................................................................................................... 12
   Summary .............................................................................................................................................. 13
Chapter 2: Literature Review .................................................................................................................. 14
   Search Strategy – Father Involvement Interventions ....................................................................... 14
   Existing Interventions ...................................................................................................................... 15
   Systematic Reviews .......................................................................................................................... 16
   Reviews of universal interventions .................................................................................................. 17
   Reviews of targeted intervention systematic reviews ..................................................................... 20
      Reviews of individual interventions (universal) ............................................................................. 23
The DadRocks Study

- Reviews of individual interventions (targeted) ............................................................. 29
- Reviews of online interventions ...................................................................................... 31
- Reviews of text message interventions ............................................................................ 35
- Parent Education Implementation Model ......................................................................... 37
- Summary ............................................................................................................................. 37

Chapter 3- Methods ........................................................................................................... 40

- Purpose .............................................................................................................................. 40
- Research Question ........................................................................................................... 40
- Hypotheses ...................................................................................................................... 40
- Research Design ............................................................................................................. 41
- Setting ............................................................................................................................... 41
- Study Variables .............................................................................................................. 41
- Independent variable ..................................................................................................... 41
- Ethical Risks ..................................................................................................................... 41
- Research Based Design of a Text-Message Intervention .................................................. 42
- Intervention development ............................................................................................... 42
- Saving Brains Vietnam ..................................................................................................... 43
- In Niagara ......................................................................................................................... 43
- Barriers to engaging fathers ............................................................................................ 44
- SMS messages ............................................................................................................... 45
- Theory .............................................................................................................................. 49
- Universal program .......................................................................................................... 51
- Stock messages .............................................................................................................. 52
The DadRocks Study

Sample ........................................................................................................................................ 56
Inclusion ........................................................................................................................................ 56
Exclusion ........................................................................................................................................ 56
Recruitment ................................................................................................................................... 57
Procedure ....................................................................................................................................... 61
Surveys .......................................................................................................................................... 63
Messages ........................................................................................................................................ 64
Evaluation of program .................................................................................................................. 64
Data collection ............................................................................................................................... 65
Measures .......................................................................................................................................... 66
Pilot work of instruments ............................................................................................................... 69
Data Analyses: Primary, Secondary, Exploratory ........................................................................ 69
Primary .......................................................................................................................................... 69
Secondary Analysis ....................................................................................................................... 70
Data Management ........................................................................................................................ 70
Sample Characteristics ................................................................................................................ 70
Infant Characteristics .................................................................................................................... 71
Chapter 4: Results .......................................................................................................................... 72
Sources of information .................................................................................................................... 72
Cell phone use ............................................................................................................................... 72
Time of Day Interacting with Infant ............................................................................................. 73
Intervention Satisfaction ................................................................................................................ 73
Usability of the intervention - Feedback on messages ............................................................... 73
The DadRocks Study

Usability of the intervention - Overall study ................................................................. 75
Father infant interaction ................................................................................................. 78
Father infant relationship attitude ............................................................................... 79
Father-infant attachment ............................................................................................. 79
Perceived behavioural control (PBC) .......................................................................... 79
Couple relationship quality ......................................................................................... 79
State trait anxiety index ............................................................................................... 79
Correlations between study variables .......................................................................... 80
First time fathers ........................................................................................................ 82
Fathers with older children ......................................................................................... 83
Information Dissemination .......................................................................................... 84
Chapter 5: Discussion ................................................................................................ 85
Intervention satisfaction .............................................................................................. 85
Message satisfaction .................................................................................................. 85
Study Variables ........................................................................................................... 91
Play ............................................................................................................................... 91
Attitudes ....................................................................................................................... 93
Relationship satisfaction ............................................................................................ 94
Mental health ............................................................................................................... 94
Peer to peer ................................................................................................................ 95
First time fathers and fathers with older children ....................................................... 96
Cell phone use ............................................................................................................ 98
Limitations .................................................................................................................. 99
The DadRocks Study

*Study Satisfaction* ............................................................................................................. 159

Table 9 ..................................................................................................................................... 160

*Message feedback – three- and six-month* ........................................................................ 160

Table 10 ................................................................................................................................... 162

*Message Feedback – Semantic differential item frequencies and Means* ....................... 162

Table 11 ................................................................................................................................... 163

*Paired sample tests – baseline and three-month* ................................................................. 163

Table 12 ................................................................................................................................... 165

*Paired sample tests – baseline and six-month* ................................................................. 165

Table 13 ................................................................................................................................... 167

*Paired sample tests – three-month and six-month* ........................................................... 167

Table 14 ................................................................................................................................... 169

*Correlations: Analysis of study variables at three-months* ................................................ 169

Table 15 ................................................................................................................................... 170

*Correlations between Measures and Satisfaction with Messages at three months* ........ 170

Table 16 ................................................................................................................................... 172

*First time fathers -Correlations between variables at three months* .............................. 172

Table 17 ................................................................................................................................... 173

*First time Fathers -Correlations between Measures and Satisfaction* ............................... 173

Table 18 ................................................................................................................................... 175

*Fathers with older children - Correlations between variables at three months* ............... 175

Table 19 ................................................................................................................................... 177

*Fathers with older children - Correlations between Measures and Satisfaction* .............. 177
The DadRocks Study

Figure 1. Theory of Planned Behaviour and How It Relates to the Dadrocks Study............. 179
Figure 2. Recruitment poster............................................................................................ 180
Figure 3. Recruitment wallet card...................................................................................... 181
Figure 4. Recruitment Facebook ad .................................................................................. 182
Figure 5. Infographic of Study Summary for Participants................................................. 183
Appendix A: Stock messages.............................................................................................. 185
Appendix B: Message to public health nurses................................................................. 199
Appendix C: Survey Questions.......................................................................................... 200
Pre-study demographic information.................................................................................. 200
Mid-study demographic information.............................................................................. 203
Post-study demographic information............................................................................... 203
father infant relationship questionnaire........................................................................... 204
parent-infant activities scale............................................................................................. 205
postnatal attachment scale. [if infant already born only].................................................. 207
attitudes toward father-infant relationship....................................................................... 211
relationship quality........................................................................................................... 212
perceived behavioural control questions......................................................................... 215
Anxiety (6-item STAI)........................................................................................................ 216
feasibility questions (intervention group only). .............................................................. 216
process evaluation questions [intervention participants only]. ...................................... 217
open ended question......................................................................................................... 218
Appendix D: Write in response at three-months............................................................. 219
Content of messages could be more helpful..................................................................... 219
The DadRocks Study

Content of messages designed for fathers with knowledge ................................................................. 219
More intensive intervention .................................................................................................................. 220
Positive feedback................................................................................................................................ 220
Fathers excluded from analysis ........................................................................................................... 220
Feedback on study questions and design ............................................................................................ 221

Appendix E: Write in response - six-months - suggested changes ....................................................... 222
Content of messages could be more helpful ....................................................................................... 222
Content of messages designed for fathers with knowledge ................................................................. 222
More intensive intervention .................................................................................................................. 222
Positive feedback................................................................................................................................ 222
Feedback on study questions and design ............................................................................................ 222
Fathers excluded from analysis ........................................................................................................... 223

Appendix F: Write in response, baseline, open ended ........................................................................ 224
Appendix G: Write in response - three-months ................................................................................... 225
Appendix H: Write in responses - six-months - open ended ............................................................... 227
Study Definitions

Father involvement: how much the fathers do with or for their infant, e.g. changing diapers, purchasing items needed for baby care, playing, demonstrating affection (L. A. Rempel & Rempel, 2011).

Father-infant attachment: Father’s emotional bond with his infant (Condon, 2012).

Father-infant interactions: Play, affection and care-taking behaviours of the father with and for his infant (L. A. Rempel, Rempel, Khuc, & Vui, 2017).

Father-infant relationship attitudes: Fathers beliefs and expectations of their role as a father (L. A. Rempel et al., 2017).

Father-infant relationship subjective norms: The perceived societal pressure to be involved with their infant (McKenzie, Neiger, & Thackeray, 2017).

Father-infant relationship perceived behavioural control: The perceived ease or difficulty to perform the behaviours to care for their infant (Glanz, Rimer, Viswanath, & Orleans, 2008).

Spousal relationship quality: A factor relating to marital satisfaction. Often measured on items such as conflict resolution, problem-solving styles, and emotion regulation (Gere & Macdonald, 2013).
Summary

Background: Fathers who are actively involved with their infant show benefits to the child, to the mother, and to themselves. There is evidence that interventions, including giving suggestions of how to be better involved can increase these benefits. In this thesis, fathers of infants were sent text messages with suggestions of things they can do for their infant, with their infant, and for their partner. This is an adaptation of a program completed in Vietnam.

Aim: This thesis was designed to pilot a minimalistic intervention in Niagara, and to assess father’s satisfaction with an SMS (text message) message intervention. We also assessed whether fathers would show changes in measures of father-infant involvement over the period of the intervention.

Research Question: Would an intervention using text messages adapted from the calendar component of the Saving Brains Vietnam project be a feasible intervention to positively affect fathers’ beliefs and behaviours regarding involvement with their infants in a sample of Niagara fathers? Research design: This study was an exploratory feasibility analysis of a father-infant involvement intervention. This text-based intervention was designed based on the feedback of what fathers want, the theory of planned behaviour, and existing research.

Methods: Text messages with research-based content were sent to the fathers 3 to 5 times a week. Messages provided developmentally appropriate information such as games to play with their infants, milestones for the fathers to monitor and links to credible websites for parenting information.

Sample: Seventeen fathers were recruited either before or soon after the birth of their infant through multiple methods, including through news articles, social media, Niagara Region Public Health, and members of Dad Central Niagara.
The DadRocks Study

Procedure: Evaluation of the intervention involved online questions at baseline, and at three, and six months after the infants were born. Fathers were asked about their attitudes and beliefs about father involvement, their interactions with their infants, about their relationship with their infant and partner, and details about their perception of the intervention. Fathers were also asked about spousal relationship quality, father’s anxiety and perceived behavioural control regarding involvement with their infant. Fathers were asked if they liked the intervention and their suggestions of future recommendations.

Data Analysis: Correlations were done between study variables and with study satisfaction. Repeated measure t-tests were done to assess changes over 3 time points (baseline, 3-month, and 6-month).

Results: We analyzed data from 17 biological fathers. Most reported liking the study and the messages. There was no difference in their satisfaction with the messages between the three and six-month time points. Most reported agreement to the question “I am liking the study” at the three and six-month time points. Fathers who reported that they liked the study had increased attitudes towards their involvement with their infant. Fathers who liked the messages reported more affectionate behaviours and stronger attitude towards their involvement. Fathers who read the messages and did the activities reported more positive attitude towards their involvement and more affectionate behaviours with their infants. There was an increase between baseline and three-month follow up for father-infant interaction, especially play. Between baseline and 6-month there were significant increases in reported interaction with their infant, play and couple relationship quality. Fathers provided qualitative suggestions about the messages and how they could be improved, such as including more specific activities they could do with their infant.

Discussion: There are very few interventions for fathers as they transition to parenting. Fathers
The DadRocks Study

liked the DadRocks intervention, which indicates text messages to fathers of newborns may be a feasible and acceptable way to communicate with them. Furthermore, the messages may have helped to change father behaviours such as the amount that they played with their infants. Our pilot data support the development of a more comprehensive experimental study of DadRocks. with a large community sample that could help determine the extent to which this low-cost intervention can improve father-infant relationships. Overall, our data suggest that text messages may be a lost-cost way to communicate with fathers in ways that promote and support positive paternal care.

Future Directions: Future research should include more participants and include a randomly assigned control group. Future iterations of the intervention could include messages targeted to fathers who have more than one child or offer more specific suggestions such as tips of how to interact with their infants.
Chapter 1: Introduction

Father involvement at the transition to parenting

The transition to parenting is an exciting time for most parents but it can also be a stressful time, especially for new fathers, who may not have the same supports from social networks or society as mothers may have. Fathers who are actively involved with their infant and young children can benefit the child, themselves, the mother, and the co-parenting team. There is evidence that interventions, including those that give suggestions to fathers of how to be better involved, can increase these benefits (e.g., Mcallister, 2012). This literature review will provide an overview of the reported benefits of father involvement with infants and young children. The review will then describe a literature search on community-based programs that were designed to increase father involvement either in a specific or general population and provide a rationale for the development of a father involvement intervention designed for use in a wide population of fathers in Niagara.

Benefits on Cognitive Development

Research shows benefits of father involvement in early infancy that can be seen in infants, in the father-mother relationship and the father-child relationship (e.g., Allen & Daly, 2007, Ball & Daly, 2012). In multiple studies on father involvement, fathers who participate in play and caregiving activities have children who are more cognitively competent at 6 months, show higher problem solving skills at 1 year, have higher IQ at 3 years and once they begin school they have better verbal skills, quantitative skills and score better on measures of school achievement (Allen & Daly, 2007; Ball & Daly, 2012; Bronte-Tinkew, Carrano, Horowitz, & Kinukawa, 2008; Magill-Evans, Harrison, Rempel, & Slater, 2006). Children show greater language milestones, with less delay in babbling in infants and longer, more diverse vocabulary
The DadRocks Study

in childhood (Allen & Daly, 2007; Malin, Cabrera, Karberg, Aldoney, & Rowe, 2014). They also show increased literacy skills (Fletcher, 2009). Children of teenage mothers have increased risk for negative educational, behavioural and emotional outcomes but father involvement, as reported by mothers, may be a protective resource for children especially those whose mothers have depressive symptoms in the first 6 months (Lewin et al., 2014). This was found even if the father was not living with the infant and not in a romantic relationship with the mother. In a video-recorded home interaction, fathers who appeared withdrawn from their infants at 3 months had infants who scored lower on measures of cognitive development at 24 months (Sethna et al., 2017).

**Benefits on Social Development**

The benefits of father involvement on social development include more positive peer relations, higher empathic concern and more prosocial sibling interactions (Allen & Daly, 2007). Children of involved fathers have better emotional regulation at 18 months (Magill-Evans et al., 2006). Fathers who provide a close and secure relationship have children who are better able to handle strange situations, are better able to manage their emotions (Allen & Daly, 2007; Ball & Daly, 2012; Hoffman, 2011) and explore novel objects with a purpose (Bronte-Tinkew et al., 2008). Children of involved fathers are more prosocial, tolerant and understanding (Ball & Daly, 2012). They are more resilient in stressful situations and are more curious and eager to explore the environment and interact with strangers (Allen & Daly, 2007). Fathers who demonstrated dyadic synchrony (responding well to each other’s cues) with their infant, in a lab setting where they were asked to make their child laugh, had children with better developed affection and social bonds (Bureau et al., 2014). Adults who had involved fathers report better overall life satisfaction and experience less depression, emotional distress, fewer anxiety symptoms, lower
neuroticism and less expression of fear and guilt (Allen & Daly, 2007). They also do a greater share of the domestic work and believe in gender equality (Barker, 2015).

**Benefits on Physical Development**

Fathers can also impact their children’s physical health. Father involvement prenatally has shown benefits in reducing infant mortality, preterm birth, low birth weight and small for gestational age (Salihu et al., 2014). Fathers who are involved prenatally have infants with improved neurodevelopment, even if they were medically at-risk (Jackson, 2016). Toddlers in step-families or single parent homes are more likely to suffer a burn, bad fall, or be scarred from an accident (Allen & Daly, 2007). If there is a marital disruption after birth, children are more likely to need an ER visit and have higher asthma rates (Allen & Daly, 2007). If children are not involved with their fathers they are more likely to have asthma, diabetes and obesity (Allen & Daly, 2007). Any form of parental involvement was protective against infant mortality across racial and ethnic groups in a sample from Wisconsin (Ngui, Cortright, & Michalski, 2015). In mothers with HIV, if the fathers are absent, there is an increased likelihood of adverse fetal morbidity outcomes (Alio et al., 2015).

**Benefits to Mothers**

When fathers are supportive, mothers can be more competent parents, resulting in further positive outcomes for children (Ball & Daly, 2012). Fathers also benefit mothers by facilitating optimal health outcomes such as well-being, good postpartum mental health, a decrease in problems in pregnancy, delivery, nursing and promoting healthier pregnancy behaviours (Allen & Daly, 2007). Single mothers report more depression, higher levels of stress, higher levels of infant mortality and lower birth weight related to prenatal care (Allen & Daly, 2007). Involvement also results in fewer obstetric complications such as anemia and eclampsia for the
The DadRocks Study

mother. This may be due to the fathers encouraging healthy behaviours in the mother during pregnancy (Salihu et al., 2014).

**Benefits to Fathers**

The parent-child relationship is bidirectional. It is beneficial for fathers on their path to adult development (Allen & Daly, 2007). Involved fathers report more self-confidence and efficacy as parents and find fatherhood more satisfying, which fosters further involvement. While there are short term concerns of being a father, such as stress and conflict between work and family time, these do not seem to reduce satisfaction with parenthood. Involved fathers typically are more socially involved in community leadership and family interactions (Allen & Daly, 2007). Men who become fathers decrease their risk-taking behaviours (Zeno & Kaplan, 2014), including decreasing smoking (Bottorff et al., 2017).

Fatherhood can also make relationships stronger, including those with the extended family and in-laws (Astone & Peters, 2014). The role of a father is combined with his other roles, such as husband, son, financial provider, and member of the community that can both enable and hinder the father’s ability to be involved (Palkovitz & Palm, 2009). Social connectedness, either within the family system or in society, is important to new fathers, and fatherhood can result in an increased involvement in civic and religious organizations. There is a bidirectional relationship on fatherhood and society, where fathers are rewarded based on the cultural assumption they are more committed, and fathers also change their behaviours, increasing their productivity (Astone & Peters, 2014). Fathers can be motivated to become fathers for multiple reasons, including status, creating a legacy for the future and the enjoyment of interacting with children (Astone & Peters, 2014).
The DadRocks Study

There are also times where the relationship is not beneficial. For example, infants who are difficult to settle have fathers who report greater anger towards their infant and greater depressive symptoms (Cook et al., 2017). Infants who are difficult to soothe have parents with increased anxiety (Brooker et al., 2015).

**Benefits to the Co-parenting Team**

Father involvement can also benefit the couple’s relationship which has positive impact on the children (Cowan, Cowan, & Knox, 2010). The mother-father relationship is a powerful predictor of father involvement and the supportiveness of the mother-father relationship a year after birth is a better predictor of quality of involvement with the child than presence at birth. This ability to co-parent and raise a child may become more important to the relationship than any personal or emotional involvement of the couple (Bellamy, Thullen, & Hans, 2015). The quality of the family interactions is benefited by father involvement (Simonelli, Parolin, Sacchi, De Palo, & Vieno, 2016). Parents who have prenatal marital negativity are more likely to withdraw emotionally from their infant at 8 months and have more co-parenting conflicts at 24 months that are related to toddlers negative emotion adaptation (Gallegos, Murphy, Benner, Jacobvitz, & Hazen, 2016).

Parents who share soothing responsibilities benefit both the mother-infant and father-infant relationships (Dayton, Walsh, Oh, & Volling, 2015). Positive interactions with infants prevents the increase of fathers anxiety, and negative interactions with infants raise depression symptoms, as tracked from the prenatal period to 30 months postpartum (Figueiredo et al., 2018). At 8 months of age, fathers who could soothe their baby effectively reported higher efficacy in their abilities and their partners reported feeling less upset by infant crying (Dayton et al., 2015). Infants who cannot be soothed are at risk of head injury through shaking, as the crying can be
The DadRocks Study

interpreted as something wrong with the infant or as a lack of competency by the caregiver (Barr, 2012).

Fathers who use the teamwork approach to breastfeeding by being responsive to a mother’s needs have infants who are breastfed longer (J.K. Rempel, Rempel, Hoa, Vui, & Long, 2019; L.A. Rempel, Rempel, & Moore, 2016). Fathers who support breastfeeding by being well-informed, providing practical support, appreciating the mother and being responsive to what is needed and what is not needed, have infants who are breast fed longer than if they are not supportive in a teamwork approach (Abbass-Dick, Bich, Fisher, Rempel, 2016; L.A. Rempel et al., 2016).

Mothers can influence the extent to which fathers are part of the parenting team. Mothers may engage in “gate-keeping” by limiting the types of involvement that fathers can have with their children, or limiting access to the children (Fagan, Cherson, Brown, & Vecere, 2015). Alternatively, mothers can facilitate father involvement by encouraging or supporting certain types of interactions. The level of gatekeeping versus facilitation may be related to how competent the mother feels the father is. In a co-parenting relationship with good levels of support, fathers are more engaged with their children (Fagan et al., 2015).

In a comprehensive longitudinal study on parenting, both mothers and fathers (n=183) were measured at 2, 5 and 18 months on their perceptions of parenting self-efficacy and mothers reported on their partners efficacy as a father (Tremblay & Pierce, 2011). It was found that over the year after the birth of a first child, some fathers reported that self-efficacy increased, and marital satisfaction decreased. Mothers who perceived their partners as involved at two months had greater marriage satisfaction and father self-efficacy at 5 months (Tremblay & Pierce, 2011). Therefore, it can be hypothesized that increasing a father’s self-efficacy, by giving him simple
The DadRocks Study

suggestions through a text message, will increase the fathers’ feelings of efficacy and marital satisfaction.

There can be a decline in marital satisfaction possibly due to an increase in stress as parents experience the changes in their perceptions of self and their relationships (e.g. Darrel Cheng et al., 2011). This stress may influence the infant-parent bond. However, fatherhood can also make relationships stronger, including those with their marital partner (e.g. Astone & Peters, 2014). Couples who demonstrate malleable teamwork - cooperation, a lack of antagonism, agreement in childrearing methods, and active participation in childcare - have better satisfaction, and children who are better able to manage their emotions (May & Fletcher, 2013). This teamwork approach requires both members of the relationship to coordinate the needed tasks, but also to trust that the other person can handle the situation. This is achieved using ongoing communication, observation, and attention (L. A. Rempel et al., 2016).

Types of families

The benefit of father involvement are seen in both traditional and non-“traditional” families (Allen & Daly, 2007; Robbins, Dyer, & McBride, 2018). For example, paternal involvement is beneficial for well-being, even if the father does not live with the child. Stepfathers show a positive impact on adolescent children’s well-being if their relationship is positive. These benefits can be seen in grades, self-efficacy, internalizing and externalizing behaviours and acting out in school (Allen & Daly, 2007).

Mental Health

Postpartum depression and anxiety are becoming more widely recognized. Most research is on mothers, but there is some evidence that fathers experience anxiety during the transition to fatherhood. It has been identified in the prenatal period, and up to a year after birth (Condon,
The DadRocks Study

Boyce, & Corkindale, 2004). Some studies have shown that fathers anxiety and depression are related to each other, but that these mood disorders do not affect fetal attachment (Beesley, Karwatzki, & Sullivan, 2019). Another study found that children did not have adverse reactions in the strange situation experiment at 14 months, even if the father showed a history of clinical depression or anxiety (Lucassen et al., 2018). However, other studies have found detrimental effects in children at age 3.5, such as adverse emotional and behavioural outcomes, if fathers experienced mood disorders at 8-weeks after birth (Ramchandani, Stein, Evans, O’Connor, & ALSPAC study team, 2005). Fathers who have mental health concerns may be at risk for low father-infant attachment (Beesley et al., 2019). Other negative paternal interactions, such as demonstrations of hostility, are associated with children who have higher levels of hostility, negative social behaviour and decreased peer acceptance (Allen & Daly, 2007). A systematic review that looked at qualitative studies of first time fathers to get fathers perspectives on mental health and wellbeing, found that fathers want guidance and support around the preparation for fatherhood, and partner relationship changes to support their mental health (Baldwin, Malone, Sandall, & Bick, 2018). Fathers of toddlers reported they had a change in beliefs, including feeling more competent, after a training intervention (Salinas, Smith, & Armstrong, 2011).

Absence and stress

Children with absent fathers are less able to delay gratification and have a weaker sense of right or wrong (Allen & Daly, 2007). In boys, father absence results in unhappy, depression, dependent behaviours and hyperactivity (Allen & Daly, 2007). Girls with absent fathers are more overly dependent and internalize anxiety and depression (Allen & Daly, 2007). Infants can be exposed to stressors that create physiological changes in the body, but supportive relationships result in adaptive coping, allowing the infant to recover faster from the effects of the stress. If
infants are exposed to constant stress, without a return to coping baseline, the structures of the brain can be altered, resulting in problems in memory, learning self-regulation and problems with physical and mental health (Shonkoff et al., 2007). In a StatsCan report from 2015, only 49% of fathers report providing help and care to their children. This has increased from 33% in 1985 (Statistics Canada, 2017). This number is still concerning as it is such a low number, and it doesn’t address the quality of the involvement and care these fathers are providing. The proportion of fathers participating in household work has increased since the mid-80s (76% in 2015, up from 51% in 1986) (Statistics Canada, 2017), but the these statistics suggest that many fathers may not have had role models of the teamwork approach to parenting.

**Summary**

Overall, this has shown that there is evidence that father involvement has benefits for families including fathers, mothers, and the children. To facilitate these benefits, there is an increasing call for programs that increase father involvement (Russel, 2015). What methods can be used to increase father involvement? Is there any consistency in the programs that are delivered to fathers to increase their involvement with their child? Do these programs study benefits that are bidirectional (i.e., to both the infant and father) and to the family dynamic together? What methods work best to reach fathers who intend to be involved fathers, but may need suggestions for how to do so? To answer these questions, a focused literature review was completed.
Chapter 2: Literature Review

A literature review was completed regarding interventions designed to increase father involvement, attachment, or interactions. This is presented as a realist review, rather than a systematic review. A realist review is designed to capture the important information on a topic, by allowing inclusion of less rigorous studies than a systematic review. As there is little research on interventions with fathers, and little of it is testing the same method, this review uses the Paulson approach, of “what works for whom in what circumstances and in what respects?” (Bennett et al., 2017). The goal of this synthesis of the current state of the literature was to inform the design of a robust, novel intervention for increasing father involvement with their young infants.

Search Strategy – Father Involvement Interventions

For fathers of infants (0-6m) does encouraging involvement using an intervention (search terms: trial, program, intervention, course) in child care OR attachment OR play OR interaction INCREASE/CHANGE father-infant attachment, or the quantity and quality of father-infant interactions?

From 2012-2017, there were 776 results from “fathers AND infants AND (care or attachment or play or interaction) AND (attachment or interaction). I only viewed English, Scholarly Peer Reviewed Journals.

Titles were visually scanned. 253 abstracts were reviewed for relevance and rejected if they did not have an intervention with fathers. Fifty-three articles were reviewed, and 26 articles were included in this literature review. References from core articles were scanned and relevant additional articles were reviewed. Additional articles were based on recommendations of thesis advisor, and search engines such as Mendeley. As found in the literature, many parenting studies
The DadRocks Study
donot disaggregate findings by gender (e.g. Mcallister, 2012) so this was done manually in the
exclusion process. Table 1 provides a summary of articles important to my research design,
specifically including details first on the universal fathering reviews and intervention
publications. This table includes effect sizes for studies that were important to my research
design. In preparation for my thesis defense, I updated this search from 2017-2019, and 170
results were found. Three articles were reviewed and added to the review.

**Existing Interventions**

Programs and interventions aimed at fathers have shown benefits to the infant and father.
To best support their children, parents need skills plus confidence in their skills (e.g. Bryanton,
Beck, & Montelpare, 2013). Postnatal education can affect how parenting is enacted and needs to
address both the possible skill deficit and increase not only skills and but also confidence.
Interventions geared to fathers that teach fathers to observe and understand their infants’
behaviour can result in increased interaction activities and increased sensitivity to their children’s
needs (Magill-Evans et al., 2006).

Programs for fathers designed to encourage a caring and stimulating involvement before
the baby is born or concerns arise have shown benefits (Magill-Evans et al., 2006; Nosraty,
Mirzakhani, Golmakani, Esmaeili, & Asghari Nekah, 2019; L. A. Rempel et al., 2017;
Trillingsgaard, Maimburg, & Simonsen, 2015). Dayton et al. (2016) interviewed fathers before
their child was born and the fathers reported wanting to prepare their children to be productive
adults. However, it was noted that fathers often described their parenting role in relation to older
children (Bennett et al., 2017; St John, Cameron, & Mcveigh, 2005). Fathers also report that they
expect their bond will form over time (Darrell-Cheng, Volk, & Marini, 2011). This suggests that
active engagement with their infant may be overlooked, so interventions that focus on strategies
The DadRocks Study

for involvement with their infants would be helpful in forming the early bonds (Carlson, Edleson, & Kimball, 2014; Dayton et al., 2016; Scism & Cobb, 2017). The Best Start Resource Centre has provided a guide for working with fathers and one suggestion is to target fathers at times of transition – their transition to becoming a father is an ideal time as they will be seeking information (Best Start Resource Centre, 2012). The transition to fatherhood involves negotiating their new role and responsibilities in relation to their infant, their partner, their friends and family and to their other roles, such as that of economic provider (St. John et al., 2005). Many fathers report doing practical things to support their partners and infants. Some of these include working with the partner to negotiate the division of labour. Fathers also reflect on their priorities, such as giving up activities outside of the house, to have more time with their infant. Fathers also report that they did not know what to do with their infants and are concerned about infants’ dependence and not knowing how to interpret a cry (St. John et al., 2005). Encouraging new parents to discuss and make conscious decisions about their expectations of parenting and support needed from each other could help in the first few stressful weeks after the child was born (St. John et al., 2005).

The existing interventions show that fathers can benefit from programs that encourage their involvement. This review was done to assess what interventions, programs and strategies work to engage fathers and encourage increased involvement with their infant. I wanted to understand which programs show promise and could inform the development of a new intervention designed specifically for fathers.

Systematic Reviews

Systematic reviews were read to get an overview of the current state of the research field. The focus of these systematic reviews is what programs and methods have been used to increase
The DadRocks Study

father involvement with their infants. I will start by presenting systematic reviews of six universal interventions (i.e. those that any father can attend), then five reviews of targeted interventions (i.e. those that select participants based on some characteristic), and then present individual papers – nine on universal programs, and five on targeted programs. Five online interventions for parents will also be reviewed. Finally, 5 interventions involving SMS messages will be reviewed – while this is not specific to fathers, it helps to form a basis for the proposed intervention. I will then summarize how the information garnered from this review can be used to design a new intervention.

Reviews of universal interventions. Universal programs are available for all fathers who are interested in participating. A review by Magill-Evans et al. (2006) of 12 studies from 1983 to 2003 showed that fathering programs that encouraged involvement using infant massage, kangaroo care, and encouraging the fathers with suggestions of how to interact with their infants were effective (Magill-Evans et al., 2006). Interventions can also increase the fathers' knowledge and perceptions by increasing the fathers self-confidence or allowing them to perceive their child more positively (Magill-Evans et al., 2006).

Bryanton et al. (2013) did a systematic review on the transition to parenting for both mothers and fathers, studying the secondary outcomes of knowledge acquisition, care confidence, interaction and stress or anxiety in both mothers and fathers. They looked at any structured intervention for infants under two months old. For fathers, education about infant behaviour, such as what to expect at each developmental phase, increased father’s knowledge of their infants (Bryanton et al., 2013). This included both parents, and they wanted to measure a very specific effect, and there is little in father involvement research that is similar.
The DadRocks Study

Panter-Brick et al. (2014) completed a systematic review on international programs and interventions and how they were (or were not) engaging fathers in the program. They wanted to assess the research design and evaluation, more than the outcomes of the interventions for scope and quality. The first question was how fathers are currently involved in parenting interventions. Some programs engaged with just one parent, others worked with both parents in separate groups and others worked with the couple together. Programs like the Supporting Father Involvement (reviewed in more detail later) were good examples of good research design and promising outcomes, examining both fathers' roles and co-parenting. Panter-Brick et al. also stated that most evidence is related to mothers and data on fathers is secondary to that evidence. As many systematic reviews find, the authors report that standards such as CONSORT, that provide a framework for reporting data, were not adhered to. Studies also reported a range of outcomes and some measured parent and child outcomes such as knowledge acquisition, health behaviours and child's externalizing behaviour. Panter-Brick et al. suggest that big changes should be made in the field - that programs should engage with parents as co-parents and not implicitly or explicitly exclude fathers. They also offer best practice suggestions on design, delivery, and evaluation—relevant suggestions are covered below. The basic message is that fathers need to be treated as equals in program development and evaluation.

In a realist review on parenting interventions and in an attempt to synthesize all of the existing data on universal interventions, Gilmer et al. (2016) reviewed 72 papers and found that many interventions were lacking in theory and in measurement of behaviour change rather than just satisfaction or intention to change. For fathers specifically, they found that young fathers were more engaged after a prenatal education class, but that specific content for fathers is needed and that facilitator attributes are important. As explained in more detail later, they also found that
The DadRocks Study

fathers wanted programs that suited their needs for timing, especially during work days, and they liked active participation with their child. Social support for fathers was also found to be important. Their review indicated that there is a wide array of programs available, but Gilmer et al. suggest that this variety is needed to reach parents with different situations. They suggest that a program needs to be developed that allows parents to access information at a time or in a format that suits them (Gilmer et al., 2016).

In a 2017 review of the current state of research on father-infant bonding, Scism & Cobb (2017), found that fathers’ involvement progresses to active involvement from passive involvement. Fathers can be involved in the birth by cutting the umbilical cord, holding, or touching the baby early on and being involved in providing physical care. Fathers who provide skin-to-skin contact early after delivery provide the child with a calming environment, temperature regulation and other benefits. As the baby gets older, fathers who are bonding well show kissing, cuddling, holding and prolonged gazing at the infant. Any early physical contact increases the father-infant bond and helps support the father in their desire to provide love, nurturing and protection. The review found that there can be barriers to the fathers’ adjustment to fatherhood – they may feel alienated by the birth process and the care provider who may be focusing on the mother-infant bond. Fathers may expect that they will have an immediate bond with the infant, and if they feel they lack confidence, or if they lack guidance, they can report feelings of resentment, alienation, and frustration. Fathers who are bonding well with their infant learn to make sacrifices, balance life tasks, and create new priorities. As mentioned earlier, an important variable that can influence bonding is the marital relationship – where if there is a lack of support, or if the mothers feel the spouse is not competent, the mother may begin maternal gatekeeping.
The DadRocks Study

In another realist review, Bennet et al. (2017) studied social connections on the transition to parenthood for both mothers and fathers. Social connections are important within the extended family, but also into the community, including that of other fathers experiencing the same things. They found that fathers want connections with a skilled facilitator, a chance to connect with other fathers without their partners and online discussion groups. They also want a reduction in barriers, including organizational resistance such as a lack of focus on fathers, or father-perceived barriers, such as fear of judgement or activities that are mother-centric. There is evidence that they want activities for fathers and their children, or the whole family, instead of fathers alone (Bennett et al., 2017).

Mountain, Cahill & Thorpe (2017) completed a systematic review and meta-analysis of randomized control trials to determine if early interventions are effective in improving attachment security and parental sensitivity for both mothers and fathers. They looked at attachment security, and parental sensitivity. They reviewed 4 articles, with RCTs delivered to mothers, fathers, or caregivers before the child was three years old, via 1:1 support, group work, or guided self-help. They found that early interventions improve attachment security and ameliorate disorganized attachment (Mountain, et al., 2017).

Reviews of targeted intervention systematic reviews. Targeted programs, such as those focussing on young or incarcerated fathers, are common, and while not the purpose of this review, some are described below. As father involvement is an emerging field, these are included to get an overview of which components of programs show benefits to the fathers and children. Bronte-Tinkew, Burkhauser & Metz (2012) reviewed programs designed to increase responsible fatherhood in high-risk fathers. These included interventions such as counselling, relationship skill-building, education and employment assistance, parenting classes and methods to mediate
The DadRocks Study

fathers’ risky behaviours such as substance abuse. They found that in high-risk father populations the fathers need to learn how to care for themselves (e.g. stopping risky behaviours) before they can be responsible fathers. The authors provided suggestions based on the programs that were effective because they had good research design. They listed recommendations for designing effective programs that include making sure the material is relevant, staff is well-connected in the community, teaching is focused on a few core issues and the program uses multiple teaching methods. Individualized attention to the father was also associated with increased program effectiveness (Bronte-Tinkew et al., 2012). They also encouraged the use of an incentive (Bronte-Tinkew et al., 2012).

In a literature review and case study on parent engagement in parenting programs in the UK, Axford, Lehtonen, Kaoukji, Tobin, and Berry (2012), provided suggestions of how to best engage with parents. Themes identified in the literature review included to "work together" in partnership with service agencies, and "build relationships with parents" so that the referral source to the program is known to them and that the parents are contacted before the initial appointment by staff with interpersonal skills to notice and address possible barriers. Factors that affect access to the program, such as time demands and scheduling concerns, longer programs and lack of transportation or child care, may prevent some families from signing up. Informal and peer support element of group activities can reduce the psychological barriers. Fathers may not engage in programs because they may feel there is not a problem with their own parenting or their child's development, or they may worry how they appear to other people. Some groups of parents may be harder to engage, such as those with lower levels of education or lower socio-economic status. Axford et al. described the randomized control trial of the Incredible Years BASIC parenting program, a 12-week, facilitator led session for children 2-10 years, training
The DadRocks Study

parents on play, praise, limit-setting, for children who demonstrated anti-social behaviours. They noted there was found to be inertia in the recruitment procedures, because there were multiple levels of confusion for the providers—there were questions as to who was to be recruited (targeted vs. universal), participants did not want their clients to be in the control group and the recruitment material used overly negative language and did not explain how to find more information about the study. The referral process was strengthened, more time was spent engaging the partner agencies, more support was given to the program delivery and materials for parents were made less stigmatizing and more specific on the incentives such as free transportation. These strategies worked to get parents to sign up and attend one session, but the strategies were less successful at retaining parents to stay in the full program. Confounds were listed, such as adding new sites, and new facilitators. (Axford et al., 2012).

In a review on policies and programmes to increase involvement of fathers from before the child is born and up to 8 years, McAllister (2012) reported that there are few studies on father engagement in parenting and few with robust evaluation. They reviewed articles from the Global North and South, but only the three about data from North America will be discussed here. This paper also included a focus on families with risk of violence. McAllister’s (2012) evaluation of the Early Head Start programme in the US found that fathers in the intervention group were more engaged by their children and the children were more attentive. Evaluations of the Becoming a Family Project; the School Children and their Families Project and the Supporting Father Involvement Project found that involving both parents in the interventions was more beneficial than working with just one parent. The recommendations from the review were that fathers should be involved early on, programs should be universal (so all fathers feel welcomed) and the facilitators should be flexible about the material and presentation style, based on the needs of the
The DadRocks Study

group, rather than just teaching the group. It was also noted that programs that targeted the community with advocacy campaigns produced better results to change attitudes and behaviours of fathers (Mcallister, 2012).

In a report about domestic violence, Cooper, Wells, and Dozois (2016) reported that positive fathering is comprised of having an authoritative parenting style, and being involved. This involvement includes engagement through direct interactions with the child, accessibility while the child is doing something else, and responsibility for managing the child’s time and care. The articles reviewed are specifically about domestic violence, but the recommendations about directly marketing fathering interventions to fathers, and that interventions be evaluated are important (Cooper et al., 2016).

Reviews of individual interventions (universal).

Below, individual articles will be reviewed to identify methods used to increase father involvement.

McKellar, Pincombe, Henderson (2008) completed an action research study, to design and assess the utility of postcards for fathers of infants with information for new fathers. Their open-ended and focus group results suggested that, as other studies have found, fatherhood requires learning a new skill, but many fathers are not able to invest the time in learning it. Fathers most commonly reported their role in relation to older children, such as playing a sport with them, so training them on infant care and interactions can be beneficial. McKellar et al. used surveys and interviews to determine what to include on postcards that were distributed to fathers as part of their hospital discharge package. Using an open-ended questionnaire, fathers reported concerns about their partner’s well-being, about having a healthy and happy baby and their role as a father. Based on the data, four postcards were created that had information on their
The DadRocks Study

newborn’s abilities and needs, how to be involved in their care, supporting each other, and services and supports available for fathers. The majority of the fathers in the study reported using the postcards and found the content to be useful and they increased the fathers’ knowledge and ability to access services (McKellar et al., 2008).

In a study of a home-visiting program, fathers were videotaped interacting with their newborns, at both 5-months and 6-months, then the videos were reviewed and discussed with the fathers, by specially trained nurses (Benzies, Magill-Evans, Harrison, MacPhail, & Kimak, 2008; Magill-Evans, Harrison, Benzies, Gierl, & Kimak, 2007). Fathers were randomly assigned to the brief intervention, or a control group where they discussed child appropriate toys with the nurse. The nurses reviewed the video tapes for moments where the father noticed the infant’s cues or was responsive to the infant and positive feedback was given to the fathers. They provided the fathers with handouts of suggestions to follow their babies’ cues for when they are ready to learn and how to best facilitate the learning. At an 8-month follow-up, fathers reported liking the individualized programs that allow them to spend time with their infant and give specific suggestions of things they can do while playing with their infants and demonstrated higher interaction with their infants than a control group. (Benzies et al., 2008). To review which fathers benefited, fathers with marked changes in their scores between five and eight months were analyzed. There was only one significant finding, that fathers with a marked positive change had less skill in interaction as compared to fathers with a marked negative change. There was a trend for fathers with marked positive change to parent girls as compared to boys (Benzies et al., 2008).

In a similar study, fathers were tested on the effects of video monitoring when the infants were five and six-months (Magill-Evans et al., 2007). The control group discussed age
The DadRocks Study

appropriate toys with a nurse. Fathers in the intervention were more skilled at promoting cognitive growth, and were more sensitive to their infants cues at 8 months. There was a significant difference between group and time for fathering scores where the intervention group increased, and the control decreased, with a medium effect size ($\eta^2 = 0.07$). The control group was less sensitive to their infants’ cues with a medium effect size ($\eta^2 = 0.06$), and there was a main effect for time, such that efficacy decreased with a large effect size ($\eta^2 = 0.23$) (Magill-Evans et al., 2007). This study was also done with late-pre-term infants, with either 2-home visits, or 4-home visits, or a comparison group. As before, the intervention included videotaping the fathers and providing feedback and suggestions. Fathers in the 4-visit group scored higher than the control group in the Parent Child Interaction Teaching Scale and its subscales, with a medium effect size ($\eta^2 = 0.061$), but not on other measures (Benzies et al., 2013). Although these interventions are described as a brief information intervention, they are still labour and resource intensive, with staff needed for the home visits, and equipment for recording, then time for reviewing for feedback with the fathers.

A hypothesis proposed by some researchers is that fathers may feel underprepared as they may lack role models, have fewer social opportunities and fewer institutional supports than mothers do to help their transition to parenting (Sponsler, Weatherspoon, Weatherspoon, & Campbell, 2015). Group learning interventions, such as an infant massage course, can help to increase the fathers’ efficacy and create a group bonding experience. In a quasi-experimental study, father’s attachment was fostered through infant massage, with the intent of decreasing parental anxiety. A 4-week intervention teaching fathers hands-on techniques to care for their infants, through infant massage, was shown to decrease the father’s stress and increase his efficacy, with a time by group interaction that was large $\eta^2 = .38$. (Darrell-Cheng et al., 2011).
The DadRocks Study

After this short intervention, the fathers reported feeling more capable in knowing they could care for their child independently.

A study of fathers trained by nurses about the dangers of shaking infants and how to cope safely with crying showed evidence that the program reduces the risk to the infant. This was measured by the frequency of shaking injuries treated at the hospital. The rate of shaking injuries reduced from 14 injuries to infants born during the pre-intervention control period, to two shaking injuries to infants born during the post-implementation period (Altman et al., 2011).

The “Supporting Father Involvement” intervention is a 16-week curriculum that is designed to “Strengthen fathers’ involvement in the family, with their children and with the mothers of their children” and to “Promote healthy child development” (Public Health Agency Of Canada, 2017, p. 1.). The goals are to promote positive changes at an individual level, by targeting the life stress-support balance and in relationships – in the couple, the parent-child and family-of-origin (Public Health Agency Of Canada, 2017). This program was good at engaging fathers in their intervention and focuses on the co-parenting team (Panter-Brick et al., 2014). There were increases in fathers involvement and engagement, parenting stress behaviours, and couple satisfaction with follow up at 18 months (Panter-Brick et al., 2014).

The MenCare campaign was designed to provide access to best evidence guidelines, trained healthcare, and childcare workers to address fathers as part of the caregiving team (Barker, 2015). It resulted in more men coming to prenatal visits and being more involved in health care decisions. This training of the public sector workers to engage fathers also resulted in fathers doing more hands-on caregiving, which resulted in mothers having less stress and using less corporal punishment. Statistics were not included in this report. Also, the boys who watched
The DadRocks Study

their fathers perform care work and help with domestic tasks did a greater share of the work when they became adults (Barker, 2015).

Interventions that promote involvement in the birth process, and physical contact with the infant after birth promote effective bonding. Including fathers in antenatal and labour process, including decision making, help to reduce the mother’s fear, increase support and allow the father to advocate for the birthing plan (Scism & Cobb, 2017). In an intensive intervention, with three sessions before birth, fathers who were taught about the pregnancy changes in the mother, their role as a father, the concept of attachment and behaviours to encourage the attachment, had better father-infant attachment three weeks after the intervention (as compared to a control group). These had large ($d = .48$), and very large ($d = .74$) effect sizes (Nosraty et al., 2019).

Studies with minimal intervention, just encouraging some typical father involvement interactions, can also increase later involvement. Fathers who were involved in birth by cutting the umbilical cord showed increased emotional attachment (e.g. more affection) one month after birth, compared to fathers who did not cut the cord who showed a decrease in emotional involvement (Brandão & Figueiredo, 2012). Skin-to-skin contact has been hypothesized to provide feelings of safety and comfort to the infant, promotes bonding (Sponsler et al., 2015) and reduces infants’ pain during medical procedures such as blood tests (Johnston et al., 2017).

Infants whose fathers participated in kangaroo-care had better motor and cognitive development at 3 months (Magill-Evans et al., 2006). Fathers who participate in skin-to-skin care report that they felt helpful to their infant and it appears that this simple intervention can increase the confidence of some fathers who report feeling their role is less important than the mothers, (Sponsler et al., 2015).
The DadRocks Study

The Saving Brains project was an extension of a project designed to teach fathers to support exclusive breastfeeding for the first 6 months (Bich, Hoa, & Målqvist, 2014). The Saving Brains Project added to that intervention by providing fathers tools for effective interaction with their infants (L. A. Rempel et al., 2017). Fathers received training from healthcare providers on how to provide breastfeeding support and interaction techniques with their newborns. Midwives encouraged father interaction with the infants as soon as they were born, encouraging the touching of their babies, eliciting the grasping reflex and attempting to elicit facial mimicking. Fathers also attended peer led group sessions before the birth of their baby and after their baby was born. To target the community aspect of father involvement, posters were hung in commune health centres and a 10-minute message was broadcast on community loudspeakers once a week (L. A. Rempel et al., 2017).

Fathers were given a father-infant relationship calendar that had five pages of developmentally appropriate ways that fathers could interact with the infants (L. A. Rempel et al., 2017). It was broken down into the first month, from 2 to 3 months, 4 to 6 months, 7 to 9 months, and 10 to 12 months. The fathers could write their own observations and add their own photos. This calendar also contained a page outlining the details of the principles of father involvement. During home visits at 7 days, 6 weeks and 15 weeks, counsellors reviewed relevant calendar pages with the fathers and encouraged fathers to come up with their own ways of interacting with their infants. At follow-up, there were 368 families in the intervention district and 403 control families in the study. Eighty percent of the intervention fathers reported using the calendar and most agreed that they enjoyed using it and that it helped them. Fathers who indicated they used the calendar reported more affection, play and caretaking at 9 months compared to those in a control commune, using the Father-Infant Interaction Scale created by L.A. Rempel & Rempel (2011).
Further, fathers were asked to rate the value of the calendar and their reported enjoyment of the calendar was related to affection, play and caretaking at 9 months. Fathers were also asked to report if the calendar was useful; if fathers found it useful, they had higher 9 month scores for affection, play and caretaking (L. A. Rempel et al., 2017). There was a difference in father-infant interaction that at one month and four months; the intervention group was higher than in the control group. There was a difference between intervention group and control group, in play ($\eta^2 = .03$) and affection ($\eta^2 = .04$) at 1 month. At 4 months, there was a difference between play ($\eta^2 = .02$), caretaking ($\eta^2 = .01$) between groups.

The intervention group had lower father relationship attitude at baseline that increased during the intervention while the attitude in the control group remained the same. There was an interaction in a repeated measures analysis for the three time points, $F(2,1432) = 7.43$, $p < .001$, partial $\eta^2 = .01$. Father-infant attachment was higher in the intervention group than in the control group ($\eta^2_{\text{baseline}} = .07$, $\eta^2_{4\text{month}} = .11$, $\eta^2_{9\text{month}} = .17$). Infants were measured at 9-months on developmental milestones, and the intervention group had higher language, smaller scores on motor and personal social scores.

This study used a large sample, but there were many levels to the intervention. This means that the calendar on its own might not result in the effects seen in the overall intervention, but that fathers rated the calendar as being valuable is promising for this intervention.

**Reviews of individual interventions (targeted).**

Using the Baby Elmo program, which is designed to teach father involvement and sensitivity through videos and interactions with their infant and toddler; fathers of infants demonstrated greater gains on emotional responsiveness (e.g. identifying the infants emotional needs) than fathers of toddlers as analyzed in a regression model. (Barr et al., 2011). The
The DadRocks Study program teaches parenting skills through simple videos designed with Sesame Street characters and includes guided visitation with their children. When 19 incarcerated teen fathers participated in the program, they developed a greater understanding of their impact on the children’s futures outside of the standard financial contributions that are not an option for these fathers. There were improvements on the quality of the interactions with their children, such as greater responsiveness to the child’s need and improved ability to set limits. A co-parenting component also improved partner interactional quality and communication skills (Richeda, Barr, Cowan, & Rodriguez, 2015). The Baby Elmo program has also been demonstrated to increase emotional responsiveness in another sample of incarcerated teenage fathers (Barr et al., 2011).

Figuring It Out for the Child (FIOC) is a 7-session intervention that was targeted at unmarried, uncoupled African American families in the United States (Gaskin-Butler et al., 2015). The design was to get mothers and fathers working together as a co-parenting team, even if the father was not living with the child. The FIOC program uses peer-mentorship and insight- and skills-based sessions to encourage father involvement. (Gaskin-Butler et al., 2015). They studied nineteen families after the FIOC intervention using a video tape of an interaction between the infant, and both parents. In 16 of the 19 families, the parents displayed moderate-to-high levels of cooperation, warmth, or sensitivity; the strains regarding co-parenting challenges were low in 9 out of 16 families, and all babies engaged with both fathers and mothers during the interaction.

In the Dad2K program, educators attended homes of four fathers who were at risk for child maltreatment due to either low income, young paternal age, ethnicity, history of maltreatment during their childhood, or substance abuse (Self-Brown et al., 2015). The educators provided tablets and allowed the fathers to use specifically-designed software, which included
The DadRocks Study

videos with instructions, modeling and motivational interview by the educators and skills
presented with a sports-themed approach. The home visitor encouraged the father to engage in
the practice of the target skill and provided feedback to the father. After the pilot intervention,
fathers were observed to show improvement in the skills, such as daily activities like brushing
their children’s teeth, being targeted and taught by the researchers. The skills were measured
based on factors such as preparing for the activity, engaging with the child during the activity,
and cleaning up after the activity (Self-Brown et al., 2015).

Frank, Keown & Sanders (2015) studied an intervention targeted to fathers of older
children (3-6 years) with conduct disorder, but specifically addressed the parenting teamwork.
Triple P is a group parenting program about parent-child interactions, that teaches parents to use
positive parenting strategies to help to manage difficult behaviours. Frank et al. added
information specifically for fathers about the benefits of father involvement, strategies for
managing father reported challenges (such as work-life balance, parenting as a team) and topics
the fathers were interested in (e.g. enhancing children’s social skills and competence). These
were found to be beneficial to the fathers and the co-parenting team by decreasing reported
behaviour problems (large effects, $d = 1.76$), and conflict between the parents ($d = 0.61$). Fathers
also contributed sharing to the parenting group using a sense of humor, compared to mothers
who contributed personal stories and co-parenting cooperation (Frank et al., 2015).

Reviews of online interventions

Online interventions can show benefits to the father-child relationship, and have a limited
cost, and allow for wide uptake of a program (e.g. Hall & Bierman, 2015). Only a few studies
have addressed fathers’ preferences for intervention delivery methods. One study found that
fathers want interventions that are not time intensive and supported the idea of an internet-based
The DadRocks Study

intervention (Tully et al., 2017). Tully et al. (2017) asked fathers whose children had high or low externalizing behaviours their preferences for an intervention. They found that fathers wanted brief or internet-based programs, wanted to know what the program involved and that it was effective (Tully et al., 2017). In a systematic review of parenting interventions for older children, internet-based programs had greater levels of completion than face-to-face interventions and showed promising efficacy in increasing parent and child outcomes (Breitenstein, Gross, & Christophersen, 2014). Fathers also report liking online interventions such as discussion groups (Bennett et al., 2017). Interventions involving text messages have the same benefits (e.g. Orr & King, 2015).

A research team in Perth, Australia has studied father involvement in breastfeeding support. Maycock et al. (2013) did a large-scale intervention study of fathers supporting breastfeeding using minimal interventions - an antenatal class for fathers after couples’ prenatal class and support packages for 6 weeks after birth. They found a 6% increase in any breastfeeding of infants for fathers in the intervention compared to a control group. They also found that infants in the control group were more likely to be fed full formula at 6 weeks postpartum. The team has now developed the MilkMan app, a mHealth application that fathers use to gain knowledge about breastfeeding and early infancy and to encourage fathers to be part of the breastfeeding team (White, 2016). Their app is based on the engagement model of social cognitive theory (SCT) which is an interpersonal model that proposes that learning is an interaction between the social environment, the psychosocial determinants of behaviour and the individual. The Milk Man app uses several engagement strategies. The first is push notifications twice a week linking the user to new discussion topics. It also uses social connectivity through guided conversations from the administration team of posts or polls where users can add
The DadRocks Study

comments and like or recommend other users’ comments. It has an information library with articles of approximately 150 words on topics such as preparing for fatherhood, infant feeding, managing expectations and how to seek support, with static information and links to external service providers. Finally, it uses gamification with leaderboards, badges and points allotted when users comment on posts, contribute to the conversation, receive “upvotes” or read library articles. So far, only formative data has been released and the fathers show a range of liking of the ideas, for example, some liked the idea of the discussion board and others said they would prefer to talk to people in real life. The developers of the Milk Man app suggest that comprehensive evaluation plans are required to determine the efficacy of mHealth apps and that these evaluations should be done during the formative development stage, the process evaluation and outcome evaluation (White, Burns, Giglia, & Scott, 2016). This is an exciting and promising, and well-funded intervention, but the focus on breastfeeding and not just father involvement is not congruent with what I am looking to do with this study on father involvement in general.

A 2015 review of online parenting interventions by Hall & Bierman, found that while most of the interventions were for mothers, interventions for fathers were effective (Hall & Bierman, 2015). Specifically, if a father’s Facebook network consisted of close family and friends, and if the friends responded positively to the father’s posts, the fathers felt more satisfaction. Parents who use online discussion groups reported feeling safe, and another group reported that they use the internet to find information but avoid using websites with .edu and .gov as they are too complicated. As found by others, many studies on technology-assisted interventions are feasibility and impact studies, and fewer on long term behavioural changes. Technology only interventions may appeal to higher income, well-educated parents. Internet based interventions had similar levels of attrition as face-to-face interventions. The authors
The DadRocks Study suggest that engaging both parents and promoting the positive outcomes may require both technology and synchronous communication support from professionals. Texts may be a way to deliver brief interventions, or to supplement other interventions. As with many research findings, there are conflicting findings. Some found online discussion forums could either increase or decrease feelings of parental stress. In the USA, one third of people who make less than $20,000 do not go online, and another third go online but require public access points, such as libraries. The majority of Americans have cell phones in all income levels, but offline capable applications or texts may be a way to reach younger parents or lower income levels. The authors encourage a rigorous evaluation of the outcomes (Hall & Bierman, 2015).

In a review of online programs, Nieuwboer, Fukkink, & Hermanns (2013) found that short, web-based intervention may increase knowledge and enhance parenting skills. They found that the interventions for parents that used information pages, email consultation, peer support and training modules were the most effective at facilitating change. Some used logging or recording of home experiences, remote coaching, progress monitoring and prompts to use parenting skills. Of these 19 interventions, only 1 was targeted at fathers (the New Father Network described below.)

Some studies have reviewed minimal intervention, to help to assess if lower cost programs (e.g. not needing a facilitator and space, as standard group sessions do) will also be effective. In a study designed to increase fathering efficacy and satisfaction, nurses created the New Mother and New Father Network with a library of information, discussion forums and email access to the nurses (Hudson, Campbell-Grossman, Ofe Fleck, Elek, & Shipman, 2003). Data was collected on fathers 4 weeks following the infant's birth and intervention fathers were oriented to the New Fathers Network and asked to use it for at least 20 minutes per week. At
The DadRocks Study

weeks, fathers completed the survey again and those that had access to the network, compared to a control group, had higher parenting self-efficacy ($d = 0.314$) and satisfaction scores ($d = 0.42$). Fathers also report that they liked the Network, including the opportunities to participate in the discussion groups.

There are potentially negative outcomes to online interventions. For example, in a study comparing the use of a mobile app to track information about their pregnancy and to record what their doctors tell them, compared to using a spiral notebook, it was found that those using the mobile app recorded more information, but that the mothers had decreased activation and engagement with their health care providers to be involved in the decisions about their care (Ledford et al., 2017). This is concerning, and the authors caution that apps can be engaging, but how the system encourages their use, may result in unexpected outcomes and decrease patient information seeking and activation (Ledford et al., 2017).

A study on males (not indicated if they were fathers) found that males are using technology to find information and support, but less for self-help regarding their mental health. The internet is a gateway to support and information. It was suggested that men do not want to be judged (which can be solved by being anonymous), they want the information to be relevant (e.g. through online communities) and they want action-based strategies to assist with their help-seeking (Ellis et al., 2013).

**Reviews of text message interventions**

As text messaging is newer technology, there are limited studies using this medium with fathers. In studies with mothers, Short Message Service (SMS) interventions have been shown to increase the mother’s self-efficacy in caring for their infant. Mothers who participated in a SMS study on messaging effectiveness rated themselves higher on the statement “I am prepared to be
The DadRocks Study

a new mother” (Evans, Wallace, & Snider, 2012). Low-income mothers were provided with standard medical care, or standard care plus SMS messages (Evans et al., 2012). One goal of that study was to determine the mothers’ experience with the messages – if they were understood, trusted, acted upon and if the behaviours were adopted. Another goal was to determine if the messages resulted in better behavioural outcomes. The sample size was too small to achieve significant results, but they did find increased health promoting behaviours (Evans et al., 2012).

Armanasco, Miller, Fjeldsoe, and Marshall (2017) did a meta-analysis on health prevention behaviours across adults (not specified for parents) and found that SMS interventions can create positive change in these behaviours, and that these changes can be maintained after the intervention is complete. However, it is unclear how long these behaviour changes can last; studies have in that review only looked 8 to 12 weeks after the intervention was completed. The behaviour change was maintained for 8-12 weeks. The authors found that, of the studies they reviewed, the studies with the best results had research designs that included supplementary intervention components that reinforce the information from the text messages (e.g. websites), a duration of 6 to 12 months, and formative work with the target group. Armanasco et al. also found that if the program was developed without the use of a theory, there was better effects on behaviour change. The theories ranged from social cognitive theory and the transtheoretical model, but the authors found that the studies that did not discuss a model had a larger effect. The message frequencies ranged from one a month to several daily and were most effective if the participant determined the frequency. Supplementary material ranged from printed resources, websites, and emails. The authors caution that the moderators of the short term positive effects found in these studies can change across behaviours, so the moderators should be addressed (Armanasco et al., 2017).
The DadRocks Study

**Parent Education Implementation Model.** The reviewed studies have included a variety of parenting education methods. Based on the findings from their realist review of parenting education programs, Gilmer et al. (2016) presented a useful model of the parent education implementation chain that addresses what they identify as important components of effective parenting education programs. It posits that parental education follows these steps:

A. Program development begins with a perception that there is a learning need at a universal level and that all parents will experience difficulties, lack some knowledge, and can benefit.

B. Programs are designed to meet the perceived lack of knowledge with the program based in theory and with credible information.

C. A program with strong design is delivered as designed, and parents can access and complete the program.

D. If the program has fidelity, (that it delivers what is says it will), the program will have an effect; parents will be satisfied, they can learn new information and skills and they will value, believe, and remember the information.

E. This new knowledge will be used to change their behaviour.

F. This new behaviour will positively affect their child’s development.

This chain can be seen in many of the studies reviewed above and will be used to guide the intervention.

**Summary.** Overall, interventions geared to fathers teaching involvement techniques show benefits to the parent, child, and the family relationship. Fathers felt higher efficacy in their ability and more satisfied, with medium to large effect sizes. I only reviewed articles that measured father’s changes but some studies, such as the Barr et al (2011) describe case studies
The DadRocks Study

where the children became more comfortable with their fathers after the intervention.

Interventions that include a one-on-one visit with a health care professional, such as a nurse, show benefits in increasing either father involvement, engagement, or affection. Other interventions can include fathering groups, or classes such as massage, or video observations then providing feedback to the fathers. These programs can be costly. It can be difficult for the father to attend in person sessions, based around competing commitments, such as work or existing hobbies. It can also be difficult for the father to attend a class with an infant in the first few months, while the infant may need their mother. When intervention are conducted by a health care professional, some may be better skilled than others at implementing these interventions, so the participants may have different experiences based on the facilitator.

There is evidence that the type of facilitator is important to the fathers, that they may prefer a male organizer, and they want someone engaging and that they can relate to. This can be hard to find someone to meet these characteristics, so an intervention that can be managed in a remote manner could have advantages in terms of being more standardized. Furthermore, remote interventions might be easily transferable to other contexts and locations. Programs that require fathers to attend multiple sessions often result in poor attendance, with fathers or parents attending a few sessions, then the realities of their time commitments may get in the way of them attending other sessions. Brief interventions, such as those teaching infant massage and bathing techniques in a one hour lesson show increased father engagement and involvement (Panter-Brick et al., 2014). Fathers also report liking brief interventions (e.g., Tully et al., 2017), and since fathers can be difficult to recruit into studies that are time consuming, a minimalistic intervention, with no in-person requirements, and where fathers can use the knowledge immediately, may have benefits. Interventions that do not require in person attendance can have
The DadRocks Study

concerning benefits, such as decreased engagement in studies on mothers, but since there are limited resources available for fathers, it is likely that providing fathers any information, and encouraging discussion with their partner, will increase their engagement with their child.

The Saving Brains Vietnam intervention included a component, the father-infant relationship calendar, that could be adapted and tested as a minimalistic intervention. The messages in the calendar were all evidence-based. It was also a tangible way for the fathers to interact with the message, that they could read, and reread the message if they were unsure of something. We developed text messages adapted from the calendar component of the Saving Brains Vietnam project and conducted this study to assess the feasibility of an intervention providing text messages over the first 6 months of their infant’s life and to examine the effects of that intervention on fathers’ beliefs and behaviours regarding involvement with the infants.
Chapter 3- Methods

Purpose

To increase involvement and affection shown by fathers towards their infant, using a minimalistic intervention.

Research Question

Would an intervention using text messages adapted from the calendar component of the Saving Brains Vietnam project be a feasible intervention to positively affect fathers’ beliefs and behaviours regarding involvement with their infants in a sample of Niagara fathers?

Hypotheses

The DadRocks intervention, sending text messages with suggestions to fathers of things they can do for and with their infant and partner, and that provides the fathers with information about infant developmental milestones, would increase father-infant attachment over the 6 months of the intervention.

The DadRocks intervention would increase father-infant interactions.

The DadRocks intervention would improve father-infant relationship attitude.

Fathers would like the DadRocks intervention.

Fathers who report liking the study the messages, or study overall would have higher levels of involvement.

Fathers who are in the DadRocks intervention would have improved spousal relationship quality.

Fathers’ perceived behaviour control regarding father involvement would increase during the DadRocks intervention.

The DadRocks intervention would influence fathers’ anxiety.
The DadRocks Study

**Research Design**

This research was a pilot adaptation study using a repeated measure design, and a mixed method data collection, to determine behaviour change over time, and the usability of the intervention.

**Setting**

This study was conducted within the Niagara Region in south eastern Ontario, Canada. Recruitment occurred through news stories, through Niagara Region Public Health (NRPH) nurses interacting with families, and wallet cards distributed in strategic locations and events. Consent and survey were completed online. Messages were sent to cell phones via an online cell-phone service.

**Study Variables**

There were multiple variables studied, including father-infant relationship attitudes, father-infant activities, father-infant attachment, attitudes towards father involvement, relationship quality, perceived behaviour control, state and trait anxiety, and perceptions of the intervention.

**Independent variable**

The independent variable was the time points in the DadRocks intervention, which were baseline, three-months and six-months.

**Ethical Risks**

There were no expected ethical risks. In the consent form and some messages, fathers were provided with the phone numbers for the Niagara Region Public Health (NRPH) Parent Talk Line, and Telehealth Ontario. These services could answer questions about potential concerns they may have had as parents regarding their infant’s health. Data was analyzed as
The DadRocks Study

outlined, and no details about participants name or cell phone number were in the analysis file, or in the presentations of the data.

**Research Based Design of a Text-Message Intervention**

**Intervention development.** This current study involved the development an intervention designed to help new fathers explore methods of interaction with their infants. The intervention involved sending evidenced-based text messages to fathers of young infants with suggestions of things they can do with their infant, information about early infant development, or prompts them to engage in further learning through credible websites. This intervention was adapted from the intervention in the Saving Brains Vietnam project (L. A. Rempel et al., 2017) and modeled after components of other interventions (e.g. “Milkman app”). The intervention was evaluated in three phases (pre-study, 3-months, and 6-months) to determine if this is a viable intervention that could be implemented on a larger scale.

The intervention is named the DadRocks study. There are multiple levels of relevance to this name. First, it suggests how great dads are, given the positive colloquial connotation to someone “rocks at something”. Second, there is a current trend in which people paint and hide rocks, then post the locations on social media for other families to find—basically an introduction to geocaching for children. This is an activity that I have seen fathers participating in. The third level is music. This comes from the social media trend of fathers playing music with their children. Commonly, father interventions have used male-stereotyped theme (e.g. the sports theme in Self-Brown et al. (2015)). Because it does not suggest such stereotypes, the DadRocks theme is expected to appeal to a broader range of fathers. This theme did not play a large role in the design but was used in advertising.
The DadRocks Study

**Saving Brains Vietnam.** The Saving Brains Vietnam project aimed to examine the effect of encouraging fathers of infants to develop positive relationships with their children. The researchers used a multi-faceted intervention. The intervention was developed for fathers in Vietnam who traditionally are the economic provider and the head of the household, but they wanted to use the recent cultural shifts that puts fathering into more contemporary involvement with mothers and children (L. A. Rempel et al., 2017). In Vietnam, extended families often live together, limiting the amount of involvement fathers have and likely the amount of involvement they saw their fathers role model (Salaeva, 2016). This is not likely the case in Canada and the content of the intervention was tailored accordingly.

**In Niagara.** In Canada, fathers are already more involved and have higher levels of expectation of involvement. To measure father involvement in Niagara, Niagara Region Public Health (NRPH), in collaboration with DadCentral Niagara, conducted an online survey in which fathers completed information about their basic demographics, what they do with their children and how they think Niagara could be a better place to raise their children (Niagara Region, 2017). The goal was to collect data from 200 fathers, but 1,511 fathers responded to the survey, with 50% of them writing in responses to the open-ended questions. In the open-ended questions, fathers said they wanted activities, groups, and resources, such as learning materials, specifically for fathers. On the NRPH website, there is a very small page about “Becoming a Dad”, but it does not contain specific information about being a dad in Niagara, it just has links to other father resources available (“Becoming a Dad (Niagara Region Public Health),” n.d.). This shows that, even though NRPH knows that fathers want resources designed specifically for them, there is little available. Thus, the text messages in the DadRocks intervention were
The DadRocks Study
designed to be a resource specifically for fathers, that could help address barriers to engaging them.

**Barriers to engaging fathers.** Interventions directed at fathers can experience difficulties recruiting and engaging fathers. There are many perceived and actual barriers for father engagement in interventions. Fathers’ negative perceptions about existing programs include that they are intrusive, not relevant or too time demanding (Axford et al., 2012; Whittaker & Cowley, 2012). The benefits to the fathers must be clearly presented in order to outweigh any costs they perceive of engaging in the program (Whittaker & Cowley, 2012). Interventions that do not require in-person attendance, such as internet-based, software, or SMS messages, can increase skills while reducing costs. As Tully et al. (2017) found, fathers want brief or internet-based programs. Software interventions also allow for standardization of messages and adherence to protocol while providing multimodal learning (Self-Brown et al., 2015). Another concern with existing programs is lack of retention; for example, with face-to-face sessions, once a family misses one session, it is easy for them to miss future sessions unless they are contacted (Axford et al., 2012). Fagan and Palm (2015) discussed the need to find the correct dosage and to provide the program in a method that promotes male friendliness.

The text/SMS based program in this study allowed us to meet these needs. It involved frequent contact, for example, 3 to 5 times a week with text messages. This provided frequent contact with the fathers and hopefully keep them engaged in the study and with their infant. Programs that are effective with fathers ensure the program runs for long enough to produce a significant change with a minimum of 6 weeks (Bronte-Tinkew et al., 2012). Thus, the DadRocks intervention ran for 6 months
The DadRocks Study

Fathers in Tully et al.’s (2017) study reported cost as a barrier, although many services and programs were offered for free. Fathers also reported that they were not aware of parenting programs, or did not know where to go to participate (Tully et al., 2017). This was also found in the NRPH Fathering Survey as fathers reported that they were not aware of programs offered for fathers, although most NRPH programs are designed for both parents; or the fathers reported that there were no family friendly events although there is something offered for free many weekends in Niagara (Niagara Region, 2017). DadRocks addressed this concern by sharing events that were appropriate for families on and open DadRocks Facebook page.

**SMS messages.** To create an intervention with minimal cost and maximum engagement, the DadRocks intervention modeled the paper version of the Father-Infant relationship calendar, instead using mobile phone technology.

Programs designed for fathers need to be culturally significant (Panter-Brick et al., 2014)—an intervention delivered through a smart phone also allowed us to be relevant to modern fathers. Cell phones can be personalized with pictures, apps and allow access to important information such as calendars or banking information. This can increase acceptance to eHealth applications as the phone is such an integral and positive part of the users daily routine (Klasnja & Pratt, 2012). Cell phones are an important part of many people’s day and their built-in technologies make it easy to adapt to eHealth platforms.

When designing the study, we initially worked to develop a smartphone app, as compared to SMS messages, but it was not feasible for this project. As part of this app development, the DadRocks team applied for an opportunity to have a team from the Goodman School of Business MBA course to develop an app. After many communication meetings and messages, the design was confirmed. The final app had a Dads Guide, with research-based resources and websites, and
The DadRocks Study

the messages could be sent through the app. However, the product developed by the student team was only available on Android, and the fathers would have needed a password each time they logged on. It also did not allow for push notifications, and fathers would have had to log on each day to ensure they received the content. It was decided that fathers would likely forget to log in each day or would stop logging in in the windows where there was more of a delay between messages. The immediacy of push notifications was also critical to the intervention, where the fathers were prompted to act when they saw the notification. Therefore, we chose to use SMS messages instead of continuing to pursue development of a cell phone app for this study.

Researchers can communicate with participants through SMS/ text messages and participants’ access to the internet allows for inclusion of web pages for further information and allow for real time updating if changes are needed to the information sent to participants (Klasnja & Pratt, 2012). Basic text messaging (SMS) allows for an information loop, with push information being sent to users and users able to respond, and the system can process their responses and send feedback customized to their current situation (Klasnja & Pratt, 2012).

In reviews of SMS interventions designed to promote preventative health behaviours, SMS interventions showed positive behaviour change (Armanasco et al., 2017; Fjeldsoe, Marshall, & Miller, 2009; Hall & Bierman, 2015; Klasnja & Pratt, 2012). Many studies have included SMS as part of the behaviour change interventions and found positive behavioural change (e.g. Sandrick et al., 2017). In an SMS study on sedentary behaviours in adults, the inability to maintain a behavioural change was compared with the "messy desk" analogy—that people want to change, but obstacles prevent the actions, so messages with prompts and reminders may help to initiate the behaviour (Schwerdtfeger, Schmitz, & Warken, 2012).
The DadRocks Study

Text messages directed to new mothers to augment the peer counselling process and increase their breastfeeding initiation and engagement increased breastfeeding behaviours, especially for those who were engaged in the intervention and replied to the messages (Martinez-Brockman, Harari, & Perez-Escamilla, 2017). SmartMom is a one-way text messaging prenatal education program created based on discussions with expecting mothers (Munro et al., 2017). The mothers reported that text messages is how they sought information and that child-age-specific information was suitable. In a study on bi-directional text-messages in a nutrition education program, prompting the participants with a text that they would be sent a question in a few minutes (e.g. "Text2BHealthy checking in again! We will be texting you a question in about 10 min. We want to hear from you!") increased the response rates (Grutzmacher et al., 2017).

Axford et al. (2012) suggested that, to engage parents into an intervention, making programs easily accessible is important. The DadRocks intervention was designed as an SMS intervention with messages sent directly to fathers to encourage involvement. It reduced most accessibility concerns by being informal and not requiring the time commitment, transportation needs, or child care needs to attend in-person sessions. Fathers prefer active involvement in activities as opposed to informational meetings or support groups (Magill-Evans et al., 2006). Although receiving the message was passive, many of the messages offered suggestions of active involvement with their infant. This involvement was flexible around the father’s time and schedule – e.g. with the suggestion to play with a favourite toy, if a father only had a few minutes, he could still complete this activity.

Some studies have found that interventions with messages tailored to the recipient (e.g. including their name, details about them) result in less attrition (Fjeldsoe et al., 2009). Other studies found that tailoring and targeting did not make a difference in outcomes (Armanasco et
The DadRocks Study

al., 2017). The meta-analyses by Fjeldsoe et al and Armanasco et al., studied different behavioural changes and determined that it may be that tailoring, targeting and interactivity are more important in certain populations or for certain behaviour changes. It was decided to not tailor messages in the DadRocks study. This was decided for a few reasons, most importantly, that if information was entered wrong, names could go to the wrong participant, and staff at the text company had access to the contact list, so only including their participant number and phone number ensured their names remained confidential.

Higher perceived benefits from participating in interventions have been associated with higher intentions to participate, as have higher perceived self-efficacy (Salari & Filus, 2016). Incentives to participants also have been found to increase participant response rates. Although we were not able to provide incentives, DadRocks messages included reminders of the benefits to the children, which hopefully increased the father’s intrinsic motivation keeping them involved in the study. The fact that the DadRocks SMS messages came to a device that the fathers would usually carry allowed to act upon them when they are prepared to do so, hopefully ensuring engagement, and increased involvement with their children.

Messages in the DadRocks program were only one-way – that is, fathers could not reply directly to the text message to receive a response. The decision was made to not reply to SMS messages because I was concerned that I could not answer the messages in a timely fashion, or that specific answers may be interpreted in an ambiguous way by fathers. In a study on high-risk infants (born preterm), parents report wanting to be able to communicate with professionals in different ways (Liu et al., 2012). Furthermore, Tully et al. (2017) found that fathers did not know about services. Thus, fathers were directed to reputable resources, such as the Niagara Region Parent Talk Line, where parents can call and speak to a nurse trained on child health concerns.
The DadRocks Study

Fathers were also directed to other sources such as Telehealth Ontario, or La Leche League, or Dads in Gear website. They also had the option to email the study account.

Carlson et al. (2014) proposed that fathers used social learning theory, that men become fathers in relation to others by observing, imitating, and formal and informal modelling. In interviews with fathers, they found that fathers want information on "how to become a dad". In childbirth classes fathers want information on what to do for their infant and partner, and programs for fathers should include connection, belonging and resources. Some fathering programs focus on life skills, such as finding jobs, but fathers also want information on child development, how to promote early literacy and how to be an effective coparent (Carlson, Edleson, & Kimball, 2014). This intervention addressed many of these concerns and preferences, by including messages on these topics, including messages on things they can do for their infant and their partner. Because fathers informed the content of the McKellar et al. (2008) intervention, ideas from their postcards informed the content of this intervention for fathers transitioning to parenthood.

**Theory.** Fathering interventions have been based on various theories. A critique of some parenting programs is that they are not developed based on theory, making it difficult to link the interventions and the anticipated outcomes (Whittaker & Cowley, 2012). Fagan and Palm (2015) suggested that programs must be developed with clarity about theory, logic and goals and promote parent-child activities, using evidence based curricula. Programs designed using a theory have been shown to be more effective (Bronte-Tinkew et al., 2012; Panter-Brick et al., 2014). The Baby Elmo program was developed for incarcerated fathers and it uses Bronfenbrenner’s Ecological Model of Development – that fathering relationships happen within multiple relationships and systems (Barr et al., 2011).
The Saving Brains Vietnam program used a combination of the ecological model and the Theory of Planned Behavior (Ajzen, 1991) to inform the components of the intervention (L.A. Rempel, et al., 2017). The DadRocks SMS intervention is limited to adapting a component of the Saving Brains program that was informed by the Theory of Planned Behaviour (TPB). This theory explains behaviours based on beliefs, attitudes, intentions and behaviour (McKenzie et al., 2017). The person’s intention to perform a behaviour are functions of their attitudes and underlying behavioural beliefs, their subjective norms and associated normative beliefs, and their perceived behavioural control and associated control beliefs. In this program, the target behaviours are father infant (FI) interactions. See Figure 1 for a visual representation of the DadRocks program as it related to the TPB. The program was hypothesized to affect attitudes by providing information about ways that fathers can interact effectively with their newborns. It did not directly work to change normative beliefs that other fathers support involvement. Perceived behaviour control is similar to self-efficacy. Fathers’ control beliefs regarding their ability to effectively interact with their infants were addressed by having fathers think about their perception of control and by highlighting their expertise in decision making and actions in their child’s life (Demontigny, Girard, Lacharité, Dubeau, & Devault, 2013). Fathering attitude and perceived control were also addressed by promoting active involvement. As fathers practice the new behaviour, their perception of control was expected to increase. For example, fathers of NICU babies report having their feelings of confidence reinforced when they were able to be involved, which promoted increased involvement (Feeley, Waitzer, Sherrard, Boisvert, & Zelkowitz, 2013). Intention was not directly measured, but we assumed that the intervention would increase their intention to be an involved father, so we expected this to be seen in their behaviour.
The DadRocks Study

There is conflicting evidence on the effectiveness of using a theory to guide the development of an mHealth intervention (Armanasco et al., 2017; Fjeldsoe et al., 2009; Mummah, King, Gardner, & Sutton, 2016). This may be because the theories are not yet adapted to the immediacy and interactivity of text messaging interventions (Armanasco et al., 2017).

There is a push to update the behavioural theories to better adapt to mobile channels (Evans et al., 2012; Riley et al., 2011) but this was not addressed as part of this masters’ project.

**Universal program.** It has been recommended that universal father involvement programs be developed, especially to garner the involvement of those who may be hard to reach (Mcallister, 2012; Shonkoff et al., 2007). There are pros and cons of targeted programs compared to universal. The universal program may have a higher total cost and lower per child economic returns, but all children who can benefit are eligible (National Collaborating & Centre for Determinants of Health, 2013; Perlman, 2012). A targeted program, selecting participants based on certain characteristics such as demographics, can result in stigma and possibly discourage people from participating in a program (Perlman, 2012). There are many programs designed for fathers as a tool to modify behaviour after there have been problematic markers such as signs of abuse or neglect (e.g. Axford, et al., 2012), but fewer population-level interventions (Gilmer et al., 2016). It can be difficult to get parents to engage and attend parenting programs (e.g. Axford, et al., 2012; Whittaker & Cowley, 2012). Targeted programs are also often ambiguous about who should be recruited into the program (Whittaker & Cowley, 2012). Positive effects of universal group-based parenting support systems have been found for mother-child programs and it is assumed that these would be present for father-child programs (Trillingsgaard et al., 2015). Thus, we designed DadRocks as a universal program that allowed all fathers with interest in participating to be involved.
The DadRocks Study

**Stock messages.** Fathers in the intervention received multiple messages each week at developmentally appropriate stages for their infant. The messages were designed to avoid content bias (Panter-Brick et al., 2014) — that parenting content is usually more relevant to mothers. The DadRocks messages were also designed to be universal, so this program could be adopted and tested in different areas, with only minor changes to the messages – e.g. changing the links to the recommended resources such as Niagara Region Public Health. Panter-Brick et al. also suggested that holistic support for both parents be offered through health, education, and social services. In Niagara, this is currently being addressed through work with Dad Central Niagara and public health nurses on the Parent Talk line who have experience receiving calls from fathers. The DadRocks messages pointed fathers to those supports.

In a study on health promotion behaviours to university students from 18 to 30 years delivered via SMS, researchers asked the students which types of messages they wanted and found they wanted a mix of informational, motivational and action-oriented content (Sandrick et al., 2017). Process motivators, such as the rewards used in some apps, may work to increase, and sustain a behaviour by increasing intrinsic motivation, as opposed to ones focussing on eventual outcomes that may be too far in the future to motivate daily behavioural change (e.g. preventing a heart attack) (Mummah et al., 2016). The DadRocks intervention does not include external rewards, but some of the messages encouraged the father to focus on the rewarding benefits to them and their infant, hopefully encouraging intrinsic motivation.

Some of the intervention messages were taken directly from the translated evidence-based calendar given to fathers in the Saving Brains Project. Others are based on additional literature. All messages can all be found in Appendix A. This appendix table includes the message, the appropriate time to send it to the father (e.g. prenatal, in the first month, etc.) and
The DadRocks Study

the source for the content. To ensure the messages are suitable and interesting for fathers, all the messages were read by 2 fathers of young children and rated on their interest, engagement, and likelihood of action. All messages were deemed appropriate.

Factors that have been found to affect first time fathers well-being and mental health include forming their fatherhood identity, competing challenges in their new role, and negative feelings and fears related to this fear (Baldwin et al., 2018). Messages such as “The transition to parenting can be hard on both mom and dad. Be sure to discuss with your partner and your family, how you want your child raised.” are designed to assist fathers in developing into their roles. In the prenatal period, fathers should be encouraged to reflect on the type of father they want to be, around involvement and participation and how to manage work and home priorities (St. John et al., 2005). Expectant parents may have expectations of their caregiving principles and how they do things during pregnancy, but they may change after the infant arrives and characteristics such as age, gender, health and temperament may require them to adapt these ideas (Winstanley & Gattis, 2013). Therefore, the DadRocks study, which provided messages to fathers over the first few months, encouraged the father to discuss the changing expectations and practices with their partner.

Fathers were encouraged to discuss the messages with their spouses and to jointly determine the type and amount of father-infant interactions that work for their family and their situation (for example, making the messages about feeding work for them, based on their choice of feeding method) (Salinas et al., 2011). Statements also encouraged fathers to draw upon their own experiences and come up with methods that use their own knowledge to identify the way that works for their family. This was designed to promote their self-efficacy.
The DadRocks Study

There were also informative messages that are intended to provide information and possibly levity, to their situation. An example is “Did you know... infant crying peaks in the second month. It then recedes by the fourth or fifth month. Hang in there, it does get better! As always if you have a concern, you can call the Parent Talk Line at 1-888-505-6074 ext. 7555” (Barr, 2012; Dayton et al., 2015).

Another example of a message providing information is “You may be finding that techniques that worked to calm your baby when they were younger no longer work. This is part of them developing and maturing. Some soothing techniques other fathers have used include: cuddling; carrying; rock in cradle; swinging; swaddling; baby sling; music; car rides.” This message is based on the study that showed that mothers use more soothing techniques than fathers do, and parents feel frustration when a technique that worked before no longer works (Dayton et al., 2015). Teaching fathers more strategies based on their maturing baby may lead them to become less frustrated and feel greater efficacy (Dayton et al., 2015).

The messages included suggestions to get the fathers motivated to be involved, such as “Do you have a photo of you and your baby? Set it as the screen saver on your phone!” Exposure to motivating images has been found to cause cognitive activation and persistent awareness and increase compliance to health goals (Klasnja & Pratt, 2012). Anderson (1996) found in interviews with fathers that there are three major categories in the initial development of the father-infant relationship. These are 1) making a commitment, 2) becoming connected and 3) making room for the baby. They found their infants smile and vocalization to be rewarding and a sign that they were doing a good job in satisfying their baby’s needs. These positive interactions increased the father’s self-esteem. The fathers in this study reported the qualities they needed to be a good father were the "need to love, protect and be emotionally present for their infants, good
The DadRocks Study

communication skills and the need to be supportive of their wives in the mothering role. Fathers did not focus on their role as a provider or disciplinarian" (p. 90). Some fathers needed reassurance that their relationship may evolve more slowly than the mother-infant relationship and they may report jealousy, exclusion, and envy of this relationship. Anderson suggested that these should be discussed to ensure they do not become problematic. Thus, this was addressed in the messages “You may find that your relationship develops differently than your spouses does, but your baby may have a special reaction for you already. Does your baby react when you come home or pick them up?”, “Does your baby smile at you? Soon they will start to smile and make sounds, letting you know that they are content!”. May et al. (2013) reported on antenatal classes and recommended that content be geared towards fathers, specifically at their relationship changes. Fathers report changes in their marital relationships, in the relationships with friends and family and in their developing relationship with their infant. These changes can result in paternal depression or psychological distress. Antenatal education about these changes can help fathers adapt better to their transition to parenting. May et al. suggest that fathers should be taught how to best support the mother, including how to provide encouragement, decision making and acceptance of mothers’ choices. Teaching fathers how to be effective partners, with cooperation and participation in childcare leads to better attachment. Teaching father's how their infants communicate helps fathers form a strong attachment with their infant. This includes infant crying and what parents can do to calm infant and how to avoid feeling overwhelmed if the infant cannot be soothed. An example of this is seen in the message: “Infants communicate in many ways, including crying. The website http://raisingchildren.net.au/ has videos to help you learn how your infant is trying to communicate with you!”. 
The DadRocks Study

Sample

Inclusion. Our sample included fathers whose partners were pregnant or had delivered an infant within the previous month. Our sample included only fathers who reside with their infant and partner, but allowed for non-biological fathers to be included in the study, as recommended by West (2007). This is because the measures of amount of interaction would vary based on if the father is not living with the child (e.g. Astone & Peters, 2014). From a study design perspective, if there are two parents in the home, there are better gains in the relationship content and there is less program drop out (Panter-Brick et al., 2014). Fathers who are not biological fathers, but are partnered with the mother (social fathers) are equally beneficial to the infant (Bzostek, 2008). Fathers in our study were asked which type of father they are, to get an understanding of our sample.

There is limited research on fathers identifying as gay, bisexual, transgender, and queer (Dozois, Wells, Exner-Cortens, & Esina, 2015). This information was not collected, and no efforts were made to include or exclude them.

Exclusion. Fathers whose infants were born premature and/or required a long hospital stay in the Special Care Unit (NICU) were excluded, as they have different needs and milestone dates than infants who are born full term (Ahlqvist-Björkroth, Boukydis, Axelin, & Lehtonen, 2016; Liu et al., 2012) and the messages are not tailored to meet these needs. There is also a range of support needed for the children and families as they transition from the NICU to home care, which would be beyond this minimalistic intervention (Gund et al., 2013; Provenzi et al., 2015).

Sample Size. As a feasibility study, as many fathers were included as could be recruited into the study (Orsmond & Cohn, 2009). The study had a response rate of 68%: 25 fathers
The DadRocks Study contacted us to participate, and 17 completed the baseline survey. When fathers contacted us, there was a range of expected due dates, from shortly after the news article was released, to one father who had just found out that he and his partner were expecting. As of January 2019, 17 fathers had begun receiving the messages, 14 had completed the three-month survey, and 10 had completed the six-month survey.

**Sample Attrition.** One participant was excluded because he indicated in the three-month follow up that he did not have a cell phone to receive the text messages. When completing the survey, he entered his wife’s cell phone and she had passed some messages on to him. One participant entered his phone number wrong on the survey, so did not receive messages until after the three-month survey, when he was asked about messages. He is not included in analysis.

One participant asked to be taken off the text list when his infant was 5-months. His baseline & three-month data is analyzed. Two fathers did not complete the 6-month follow-up survey as their infants were not yet 6 months old, but their baseline and 3-month data is included. This was a 13 % attrition at 3 months, and a further 8 % attrition at 6 months.

Therefore, the analyses include 15 fathers at baseline, 13 at the three-month time-point, and 10 at the six-month timepoint.

**Recruitment.**

I recruited fathers through multiple sources based on literature on methods that work to recruit fathers, such as social media, personal interactions and word-of-mouth (Julion, Breitenstein, & Waddell, 2012). In a study on non-residential fathers, whose children were 2 to 5 years old, fathers provided feedback about the research designs that worked for them (Julion et al., 2012). They suggest engaging fathers through social media, email, through interpersonal interactions and word-of-mouth. Furthermore, Fagan and Palm (2015) suggest that multiple
The DadRocks Study recruitment methods should be considered as fathers may be hesitant to participate. Axford et al. (2012) summarized concerns with engaging families in the United Kingdom, specifically that only 1/3 of invited families enroll in a program and then up to 60% of those families discontinue the program. They suggest that there must be constant collaboration between stakeholders – parents and community teams and that all parental concerns must be addressed.

There is evidence that fathers who participate during the prenatal phase, even if they are not married to the partner, are more involved up to three years later (Cabrera, Fagan, & Farrie, 2008). There is also evidence for the importance of recruiting fathers by explicitly welcoming them into the program and expressing the gains to them and the children (Panter-Brick et al., 2014). There may only be a small window of opportunity to recruit fathers, and other researchers have had successful recruitment by using flyers or business cards that highlight developmental benefits for children with involved fathers (Axford et al., 2012).

I recruited fathers to the DadRocks study using recruitment materials that highlighted the developmental benefits for children. See Figure 2, 3 and 4. The recruitment materials were also created in a way that is interesting for women, as it was sometimes the spouse who chooses to encourage her partner to participate, such as when moms find business cards at the midwifery clinic (West, 2007). For example, in the DadRocks study, recruitment posters were displayed in the washroom at the Niagara Midwives clinic, where most mothers needed to go to provide a urine sample at each visit. Four mothers replied to the advertisements for their partners and they participated in the study. One soon-to-be grandmother also contacted me, but her son did not contact me to participate.

On February 27th, 2018, Brock media released a news article “Brock seeks participants for study on fathers with newborns” which was picked up by other local media companies,
The DadRocks Study

including Fort Erie news. Most recruitment emails came in after these articles were released. https://brocku.ca/brock-news/2018/02/brock-seeks-participants-for-study-on-fathers-with-newborns/ ; 610CKTB http://www.iheartradio.ca/610cktb/news/brock-looking-for-new-dads-to-take-part-in-dad-rocks-niagara-1.3651392

I conducted social media recruitment through outlets such as FB and Twitter, which were the sources that fathers in the Dad Central Niagara Survey reported they used the most. There are few social network groups or pages for fathers, so these messages were primarily directed to mothers through mom networks, as the Dad Central Niagara survey was. I shared a link to the DadRocks public Facebook page through local networks, such as Niagara Mommy Network, Life with A Baby, and Niagara Region Public Health. I created an open Facebook group to allow for recruitment (facebook.com/DadRocksNiagara/). I shared this page through my personal profile with Facebook groups, such as Niagara Mommy Network (2,299 members at time of sharing), Natural Parenting – Niagara (493 members), and Managing the Motherload (3,327 members). It was also shared to other groups, but they have smaller memberships. There was at least one post a week -sharing either research-based information or memes relevant for fathers to increase engagement. Recruitment advertisements were created in Canva and shared to the Facebook pages (see Figure 4).

We recruited fathers through the health care professionals that interact with new families. Most of these were through social media. An example of the sharing is this direct message sent via Facebook:

“Can you share this with your families about to have a child, or who have recently had a child? This is a Brock research study, looking at father involvement. It involves surveys early after the infant is born, then at 3, and 6 months. Then the fathers got text messages
The DadRocks Study

from us. It's as simple as that - no in person meetings, no other time commitments! Thank you - I look forward to virtually meeting lots of new dads! Allison. “

Some organizations and providers did share the information. Other organizations were contacted but did not share the information. Some larger organizations allowed for sharing on the community section of their Facebook page, but the post was not readily visible, nor did it create a post that was shared in people’s news feeds.

We hung posters around Brock four times. I distributed wallet cards at events and to multiple organizations. Wallet cards were included in Life with a Baby promotional bags, or as a stand-alone item. As the community manager for Life with a Baby, I have a relationship with parents, and used that knowledge to engage with them and build trust. This allowed for positive word of mouth referrals amongst other parents of young children (Axford et al., 2012). In partnership with Life with a Baby, I made recruitment cards available at outreach events that were held for first time parents, such as first aid and CPR courses for how to deal with an infant emergency, or Father’s Day events to create crafts for fathers.

I wrote a blog post for Dad Central Ontario which was shared by them in their social media networks. https://thingsdadsdo.wordpress.com/2018/04/19/researcher-looking-for-expecting-and-new-fathers/

We made recruitment presentations at Niagara Region Public Health (NRPH) Family Health team meetings (3 meetings to target all teams), Dad Central Niagara, and the Prenatal Network of Niagara (PNON). Recruitment posters and wallet cards were given to these team members, and a short message that I had written was shared in the follow up email sent by their health promoter (see Appendix B). This was based on advice from research, however, it did not include tip sheets for the health care professionals of how to refer and engage parents (Axford et
The DadRocks Study

al., 2012). Although there was good engagement from the nurses and implied collaboration from these teams, including the nurses who visit each family at the hospital after babies are born, no fathers contacted us through these connections. Many of the providers who attend these meetings work with fathers (including fathers with risk factors), so getting the DadRocks name out often and from multiple forms, was expected to increase the uptake from fathers (Axford et al., 2012).

Despite this myriad of recruitment methods, most recruitment came through the Brock press article that was shared by other local news stations.

Procedure

An overview of the procedure can be found in Table 2: Summary of research protocol. Recruitment materials directed fathers to the DadRocks public Facebook site (available for anyone to see). The public Facebook page that was used for recruitment was guided by research. Niela-Vilén, Axelin, Salanterä & Melender (2014) reviewed internet-based interventions for mothers, fathers, or parents together and they found that mothers used the internet for emotional support, information, and a sense of belonging with the social community. Fathers used the internet for support, information and humorous communication (Niela-Vilén et al., 2014). A popular component of Facebook is sharing pictures, messages, and memes from other users. Thus, I monitored trending content on popular dad Facebook sites, such as Fatherly and Life of Dad and shared it to the Facebook page. This was done weekly, to ensure fathers remain engaged with the Facebook page (i.e., that it appeared in their newsfeed on a regular basis). I was also careful to not share information that would spark a debate, such as information about vaccinations. Some studies have found that fathers prefer male facilitators (e.g. Gilmer et al., 2016); while it was not possible for this project to have a male facilitator, I shared posts as the administrator and not through my personal female profile.
The DadRocks Study

Another concern could have been problematic content added by users. The Facebook site was set up that users could add new posts, but these had to be approved by an administrator (either me or my thesis supervisor) before they were made visible. It was planned that negative comments would be deleted or hidden (hidden means the poster doesn’t know the message was blocked, but others cannot see it, unless they saw it before the message was hidden). There were no negative messages, so this did not occur. For direct messages, we set an automatic reply message, so users saw the response “Thank you for your response, we will try to answer you ASAP. In the meantime, please contact the Parent Talk Line at 1-888-505-6074 ext. 7555”, or Telehealth Ontario at 1 866-797-0000 if this is a health-related question”. I followed up with all messages.

Once they navigated to the public Facebook site, fathers got more information about the study and had the option to contact the researchers via email. If they contacted me through direct message on Facebook, they were asked for their email address, and communication continued over email.

I sent fathers an email thanking them for their interest in the study and asking their infant’s due date. I created a password protected Excel file to track their names, and infant due dates. Once the infants due date was near, I sent a follow up email asking how they were doing, and included a sample prenatal message about kangaroo care. Once they confirmed the infant was born, I sent participants a letter of invitation, including the first survey link. If they did not complete the survey, I sent a reminder text a few days after their final message. This was not done consistently as it involved manually checking both Group Texting and Esurveycreator.

There was a technical problem with Participant 1. He did not receive messages from April 30th until May 24th when it was noticed he was not in the Sent or Scheduled messages. He
The DadRocks Study was contacted via text and confirmed he had not unsubscribed. The problem was not resolved by working with GroupTexting support, so a new drip campaign was created for Participant 1 with the remaining 63 messages. This happened again on June 24th, and another new drip campaign was created for him, removing some messages to ensure he received the impactful messages. This father was been sent the final survey when his infant was six-months old. He is included in an intent-to-treat fashion.

Some three-month surveys were emailed to fathers on a Sunday night. None of them completed the survey. It was realized this was an inconvenient time for the fathers – if they were receiving the email at work on Monday, they may not have time to complete them. The messages were resent on a Thursday afternoon, and all completed the survey that day.

Surveys

Survey administration was done through esurveycreator.com. I reviewed 9 survey websites and chose to use this one because it is a free service for students. It was easy to set up and I was able to copy surveys and add between the time points. They also had good customer service when I contacted them using the “Contact Us” pop up service. They were prompt, helpful, and understood what was needed, and provided instruction on how to set up their survey.

I created three surveys, including baseline, three-month and six-month follow up questions. The survey name was personalized to represent the study name and time frame, for example, “3. DadRocks 6 month Study”. The links sent to the fathers were named in a way that was clear they were different surveys, for example “www.esurveycreator.com/s/DRFollowUp”. The website allows for participants to begin the survey and complete it later, on the same device. It was expected that this would reduce the time burden if they felt they were answering too many questions. Administrators using esurveycreator cannot be emailed when a new survey is
The DadRocks Study

completed, so the website was manually checked frequently to determine when a participant had completed the survey and the data was downloaded to an Excel file. The baseline survey included a question asking the participant’s cell phone number. Once they completed the entire survey, they were added as a contact into the online texting service GroupTexting.

**Messages**

Intervention messages were sent through GroupTexting.com. I selected GroupTexting based on their low price (5 cents a message), and the ability to create Drip campaigns. In total, I reviewed 12 text-message services by searching their websites, and contacting them before making a choice.

The Drip campaign sent text messages in a prescribed order, based on the date the person was added to the campaign. I manually entered message content and the number of days after study sign up to send messages into the campaign. Messages could only be 160 characters, so some messages were sent in two messages. I was set up as a participant to receive the same message schedule as the first participant to be able to have a better understanding of the participant experience.

I sent participants 1 to 11 the invitation to complete the three-month follow up survey through an email. Because this required me to manual send the message, I sent the survey link through the Drip Campaign for the remaining participants. I did the same for the six-month follow up survey link. If fathers did not complete the survey after receiving the text message, I emailed a reminder.

**Evaluation of program.** I evaluated this program using online survey measuring fathers at baseline, three- and six-month’s post-partum. See Table 3: Schedule for surveys, for a table outlining the questions at each phase. This evaluation design conceptually replicated the
The DadRocks Study

evaluation of the Saving Brains Vietnam intervention by assessing the effect of the program on fathers’ attitudes, father-infant interaction behaviours and father-infant attachment. The repeated measures, collecting data before the text messages, after 3 months of messages and after 6 months of messages allowed us to assess the change over time. In a study on a short intervention (4 weeks of infant massage classes) on a fathering outcome (stress), a mixed-methods design allowed for an increased level of validation of the cause of the reduction in stress, that is, if the fathers felt the outcome was related to the intervention (Darrel Cheng et al., 2011). While some fathers reported that it was just due to infant development, some attributed the benefits of the intervention. Thus, I used a mixed method design to understand the effects of the program more deeply. I asked fathers about their perception of the value of the program. This allowed fathers to report if they felt it was the intervention that guided any differences in their behaviours. I assessed fathers’ satisfaction with the intervention and fathers were provided open-ended questions regarding what could be done to increase satisfaction and engagement with the intervention. This qualitative data provided information that can be used to determine potential changes to this intervention for future use.

Data collection. The DadRocks intervention was a modification of the Saving Brains Vietnam project, and I used a modified version of their main questionnaires. Items specifically developed for the Vietnam study were adapted for a Canadian population. A summary of when study measures were completed can be found in Table 2. I used following measures:

1) Father infant relationship attitude (L. A. Rempel et al., 2017) – 5-point scale.

2) Father-infant interaction (L. A. Rempel et al., 2017) – subscales: a) play, b) caretaking and c) affection. 23 item scale. Fathers rate items on a 0 to 4 scale.
The DadRocks Study

3) Father-infant attachment. (Condon, Corkindale, & Boyce, 2008) – 19-item self-report scale with subscales “patience and tolerance (absence of hostility)”, ‘pleasure in interaction’ (pleasure) and ‘affection and pride’.

4) Perceived behavioural control. Questions were created for this research project based on the suggestions of Glanz et al. (2008).

5) Couple relationship quality - intimacy, trust, commitment, and relationship satisfaction (Gere & MacDonald, 2013)

6) State and trait anxiety index short form (STAI) (Marteau & Bekker, 1992) uses six questions to measure fluctuations in state anxiety.

7) Perception of value of program / satisfaction of program. These questions were designed for this study.

The full survey can be found in Appendix C: Survey Questions.

Measures

Father infant relationship attitude. Father-infant relationship attitude was measured with three items: “Fathers need to be part of a team with mothers to jointly care for their babies,” “It is important for fathers to pay attention to what their baby needs and respond in a way that is best for the baby,” and “It is fun to play with my baby.” These were rated from 1 = strongly disagree to 5 = strongly agree. These attitudes were measured at baseline, 3 and 6 months (L. A. Rempel et al., 2017). This scale was created for the Saving Brains project. Cronbach’s alpha internal consistency reliability was .70 at baseline, and .61 at 4 months (L. A. Rempel et al., 2017).

Father-infant interaction. Father-infant interaction was measured using a 23-item Father-Infant Interaction scale which was developed based on content analysis of qualitative data to develop a list of father-infant interaction behaviours (L. A. Rempel & Rempel, 2011). Fathers
The DadRocks Study

rated items from 0 = never to 4 = very frequently. Three subscales were measured: a) Play, b) Caretaking and c) Affection (L. A. Rempel et al., 2017). Father-infant interaction was measured at baseline, 3 and 6 months. This questionnaire was developed on a qualitative study of 22 couples in Canada, who were asked what fathers do to develop a relationship with their infant. The responses were coded into behaviours using content analysis, and this resulting list of behaviours were pilot tested and refined using a sample of couples in Canada (L.A. Rempel et al., 2017). This measure has only been used in an unpublished Canadian study and the Saving Brains project, so there are limited reliability measures on the scale. Cronbach's alpha in the Saving Brains study for the three subscales ranged between .78 and .91. Because of the small sample in our study, we did not do any formal psychometric evaluation of the scale.

*Father-infant attachment.* Attachment was measured using a scale by Condon and Corkindale (1998), which is a 19-item self-report scale. Item scores are used to create a composite score that measures the strength of the fathers emotional attachment to his infant (L. A. Rempel et al., 2017). In a follow up study, Condon, Corkindale, & Boyce (2008) reported internal consistency Cronbach’s alpha at 6-month = .81, and 12 month = .78. The subscales include quality in the interaction, absence of hostility, and pleasure in interaction.

*Couple relationship quality.* To measure the couple relationship quality, I asked fathers to rate how true statements are, such as “I communicate well with my partner”, and “I am very committed to maintaining my relationship”. The scale includes subscales of intimacy, trust, relationship satisfaction, and commitment. The measure was tested in samples in the US, Canada, China and Indonesia – most questions had good construct validity, and ones that did not were removed (Gere & Macdonald, 2013).
Perceived behavioural control. Perceived behavioural control regarding father-infant interaction (PBC) was measured using 6 questions such as “I feel I am capable of interacting with my infant in any way he or she needs”, “My wife will not allow me to take care of with my infant without supervision” on a 7-point scale, where 1 is Strongly Agree such that higher scores indicate lower PBC. This measure was developed for this study based on the suggestions of Glanz et al. (2008) regarding how to create questions to test the Theory of Planned Behaviour (Glanz et al., 2008). Questions with a negative wording were reverse coded for inclusion in the composite PBC measure.

Anxiety. Fathers’ anxiety was measured using the 6-question State Trait Anxiety Inventory (STAI) (Marteau & Bekker, 1992) at the three time points. The STAI has a reliability coefficient of .82 in a study by Marteau & Bekker and is used to measure fluctuations in state anxiety.

Usability of the Intervention. Fathers’ perceptions of the value of the program was assessed using eight questions written for the study and based on program satisfaction scales by McKenzie et al. (2017). Fathers used a 5-point scale to rate what they liked about the program e.g., “I am reading the messages and doing the activities with my infant.”, “I referred to the content in the messages when I was unsure of something.”, “I feel the messages are relevant to me and my family.”, and “I felt the study overall was interesting to complete”. They were also asked 7-point semantic differential questions assessing satisfaction, such as “Did you feel the messages were… meaningful (score of 1), or meaningless (score of 7). An aggregate score of message satisfaction was calculated by averaging the item scores. High scores indicated less satisfaction with the messages. Satisfaction with the intervention was also assessed by open
The DadRocks Study ended questions regarding “Anything else you want to tell us?” and “In a perfect world, what should we change for the next part of the study?”.

Demographics. I asked basic demographic questions. I asked fathers if they attended prenatal classes with their partners as this can affect their knowledge, skills and stress levels (May & Fletcher, 2013). I asked fathers if they were participating in other programs with their infant, as those could affect father-infant interaction. I also asked at each time point, what other methods of information they have used, e.g. online searching or shared information from other fathers. Fathers were asked when they are likely to be home with their children.

An SMS study on sedentary behaviours in adults, found that either SMS messages, or an information session resulted in more activity, compared to a control group that decreased their activity. Some individuals were not satisfied with the messages and they did not receive the same benefit to the intervention (Schwerdtfeger et al., 2012). Thus, I also asked about their cell phone use – how often they had their phone with them, how many text messages they sent a month – to get a sense of their current engagement with their phone.

Pilot work of instruments. This study is a pilot intervention, so all participants were considered pilot. Most measures have been used previously, so they were not piloted. Only the perceived behavioural control questions, and the questions related to the users’ perceptions of the intervention, had not been used before.

Data Analyses: Primary, Secondary, Exploratory

Primary

Repeated measures t-tests were conducted to compare between time points on all study variables.

Correlations were conducted between all study variables at the three-month time frame.
The DadRocks Study

Secondary Analysis

Content analysis was conducted on open ended questions. I read each comment and coded for positive and negative feedback from the fathers.

Data Management

I managed data online through eSurveyCreator. No data was shared with other researchers. The data I collected contained the participants initials, phone number and infants birthdate. Personal information, such as the infants due date, or date of birth, was managed through a password protected Excel file, only accessible on a password protected laptop. Only I accessed these files. Identifying information was removed from the data entered into SPSS.

Sample Characteristics

Demographic information is presented in Table 4. Fathers had a mean age of 31.87 years (range 27-39). Most did not have older children, all were the biological fathers. One father was engaged, and the rest were married. Most fathers were employed full time, with one a student who was working full time by the three-month follow up.

Most spoke English (1 spoke English and French). Most were educated with a postsecondary degree or diploma. Fathers were provided with ranges of income. The modal income was over $100,000 and the median was calculated as $89,500, when using the middle point of the income ranges. Most lived in the Niagara Region, but some lived in other parts of southern Ontario, including Toronto, Welland, Port Colborne, Hamilton, Lindsay, Niagara on the Lake, Oshawa, and one did not answer this question.

Fathers anxiety was measured using the 6-question STAI (Marteau & Bekker, 1992). Fathers mean score was 24.67, with a range of 13 – 43. This is classified as low or no anxiety (20-37), with two fathers scoring in moderate anxiety.
The DadRocks Study

**Infant Characteristics**

The infants were mostly female. Only one infant spent time in the NICU for less than 24 hours, for above normal weight loss. Another infant was born at 37 weeks. They did not need to stay in the NICU. These fathers was included in the analysis as this is considered full term (e.g. Gund et al., 2013). Intentions to breastfeed are presented in Table 4. Most of the families indicated an intention to breastfeed. We did not ask further questions about this at follow up.
Chapter 4: Results

Sources of information

Fathers were asked about how they were accessing information. Table 5 presents their responses. At baseline, nine fathers had completed prenatal classes, either through the Region or private classes. Only five completed further classes about parenting, such as baby care workshop, baby emergency care; or a breastfeeding class. Fathers were asked about their other sources of information on raising their infants. In the baseline data, fathers reported they would access books, parenting websites, videos, family members, and social media. A few wrote in that they used NRPH, friends, midwives and YMCA. In the three-month follow up data, fathers reported that they would access family members, parenting websites, books, videos, social media, health care professionals, friends and church. In the six-month follow up, they said they would use family, websites, books, videos. One father wrote in that he would use social media, one wrote in they would use doctors, doctors, and one wrote in they would use friends.

Cell phone use

The fathers in the study were asked about how often they used their mobile phone. At baseline, 71% indicated that they used their cell phone often and 82% indicated that the carried their phones with them often. However, 27% reported that they seldom used or carried their phones. So across time points, most fathers reported the same level of cellphone use, four decreased use between 3-6 months, and one increased. Most reported carrying their phone the same amount between baseline and three-months (one increased), but from 3 to 6 months, five decreased their use. As another measure of phone use, fathers were asked in an open-ended question how many messages they sent and received. These included answers such as, 0, 3,000 and “A lot”. There was no consistency in this measure, for example, two people recorded that
The DadRocks Study

they received 50 messages a month, yet one reported in the previous question they used it often, and the other one called it seldom. This question was asked to ensure the fathers included in analysis used their phones; as all fathers included in the analysis did, no further analysis will be done on this variable.

**Time of Day Interacting with Infant**

Fathers were also asked about the time of day they would be interacting with their infant. Fathers reported a wide range of times they would be interacting with their infant. This was a write in response, so they had a lot of options. Most of them were in the evening – after work until bedtime. Some just answered “yes” that there was a specific time of day they would be interacting with their infant. See Table 6, for information regarding time of day interacting with their infant.

**Intervention Satisfaction**

Fathers were asked if they were liking the study on a 5-point Likert scale. This is summarized in Table 8. Fathers were asked at the three-month mark if they liked the study, and most agreed with the statement ($M = 3.69$). They were also asked if they felt the study was overall interesting to complete, and most agreed with that statement ($M = 3.46$). At six-months, they mostly agreed they were liking the study ($M = 3.78$) and they felt the study was interesting to complete ($M = 3.67$). This stayed similar between 3- and 6-month time frames.

**Usability of the intervention - Feedback on messages**

Fathers were asked if they were liking the messages using a yes or no question. They reported almost equally that they liked the text messages at three-months (57 %) and six- month (64 %). For more, see Table 7 which displays the fathers’ satisfaction with text messages.
The DadRocks Study

Fathers were asked about the messages on a 5-point Likert scale from Strongly Disagree to Strongly Agree. This is summarized in Table 9, with the number of fathers, and the means who reported each level at three and six-months. At three-months, on average, fathers were neutral about their enjoyment of the messages ($M = 3.08$), and somewhat agreed the messages were useful ($M = 3.15$). Fathers were also neutral on if they read the messages and did the activities with their infant ($M = 3.62$). They reported about equally that they were positive and neutral about if messages could help them understand what their baby could do ($M = 3.15$). They mostly reported that they did not refer to the messages when they were unsure of something ($M = 2.08$). They reported that did not use the suggested resources ($M = 1.92$). They did report that the messages were relevant to them and their family ($M = 2.92$). Some fathers used the suggestions of things to do with their infant ($M = 2.92$).

At the six-month follow up, most of the fathers reported that they enjoyed the messages, or were neutral to them ($M = 3.56$) and that they found the information was useful ($M = 3.56$). On average, they were neutral or agreed that they were reading the messages and doing the activities with their infant ($M = 3.67$) and that the messages could help them understand what their baby could do ($M = 3.56$). They did not refer to the messages when they were unsure of something ($M = 2.11$). They mostly reported that did not use the suggested resources ($M = 2.22$). They were neutral about whether the messages were relevant to them and their family ($M = 2.92$). Some fathers used the suggestions of things to do with their infant ($M = 3.56$). There was a slight increase in the positive response to messages, such as the increase in the question “I used the suggestions from the text messages of things to do with my infant”.

Fathers were asked 8 semantic differential questions about the messages using a 7-point scale, where a higher score means that the father did not like the messages. Table 10 includes the
The DadRocks Study

frequency of each semantic differential item and the item means. Responses were mostly neutral. For example, for meaningfulness of the messages fathers rated them neutral (3-month $M = 3.8$, 6-month $M = 3.73$). Fathers indicated that they thought the messages at three-months were predictable, as compared to surprising and joyful, rather than stressful.

To determine whether there was a change in father’s satisfaction with the messages, average scores from the 6-month survey were compared to those from the 3-month timeframe. The analyzed using a t-test that was not significant, $t(8) = .263$, $p = .799$.

**Usability of the intervention - Overall study**

Fathers were able to provide open-ended feedback; I analyzed these using content analysis (Creswell & Plano Clark, 2018). Responses were grouped into categories. The verbatim answers, sorted into the categories, are in the appendices. In answer to the question “Are you liking the study?” are in the appendices D and E. Fathers were also asked, “Is there anything you want to tell us?” at. The full responses can be seen in Appendix F for baseline, in Appendix G for three months, and Appendix H for six months. I will discuss the main categories.

Positive feedback for the study included “I appreciate the messages - my wife and I always look forward to getting them, though we find them comically obvious, as we have three children. However, it gives us an opportunity to discuss family and our relationship.” (P9 three month). Another father said, “I don't know. I don't really know what the goal of the study is; I just liked the idea of helping someone further their research on infant-father relationships. And I get to tell someone how much I love my baby.” (P10, six month).

Another theme was that the content of messages could be more helpful. This was repeated in both the three-month survey, and the six-month survey. For example, “I would have appreciated more thought-provoking suggestions and facts from the text messages … Most
The DadRocks Study

messages contained information I already knew about child development and/or were activities I actively participate in with my baby on a daily basis.” (P14, three month). , or “Less obvious tips” (P4, three month). Some fathers expanded on the idea that the messages were designed for first time dads - “Make messages more applicable for dads with more than one child - I found them extremely obvious, but I have three children. Perhaps topics relating to how siblings can play/help/assist baby and parents” (P9, three month), “…Perhaps new parents and second time parents should be grouped into different categories.” (P8, three month), and “Information for integrating new baby into a family with children already, i.e. a second, third, etc. child.” (P12, three month).

Some fathers suggested that they wanted a more intensive intervention. It was not explained in the recruitment materials why minimalist intervention was chosen. Sample responses to this include “Intervention! I’d love to do a one day workshop for dad’s (with mom’s present too).…. Done work with individuals wearing cameras. If you could do this with dad’s you’d get a great objective measure of behaviour with their infant.” (P13, three month), or “Force dads to meet each other and talk about it - that is something that never happens…. ” (P2, three month).

There was also feedback on the study design and questions, such as: “Some of your questions are irrelevant for a newborn (1 week) old baby. I also feel like you have some bias in your options. For example, they try to make visits with baby longer or shorter. You have no “not change” option which I think will give you a falsely high “spend more time” (P8, baseline). There was feedback on the study questions at three months, such as “…Survey questions are also geared towards care of the infant, of which I am doing a lot of those things, but more with my oldest child.” (P8), “Some questions I, personally, felt difficult to answer. I am self-
The DadRocks Study

employed and work from home a fair bit, so my answers regarding time with baby/text
messages/phone use reflect that. I’m not sure if these answers will screw your study, if so, I’m
sorry.” (P9, three month), and “I am the working parent; my fiancee is the stay-at-home mom.
Your study asked if the baby's need for mom (e.g. feeding) limited my opportunity to be with
baby myself, but nothing about being away at a job. So I don't spend a lot of time with my little
one :(.” (P4, three month). It is expected most fathers in the study are the working parent. At six-
months, a father responded “I don't remember if I completed the survey. Suggest emailing only
those who haven't” (P16, six month). This was the procedure that I did use. If fathers did not
complete the survey, I emailed them with a reminder.

Some fathers reported wanting further engagement with the study “I’d like to know
where/when we can find the results of the study if possible. I’m curious to know what my
answers helped compile, and see how other dads are with their babies.” (P9, six month) and
“Thanks for this opportunity. I’d be happy to participate in future studies if you are looking for
participants. Please feel free to contact me.” (P13, six month).

Some fathers included comments about the perceived role of the father, such as “…Also,
some questions like “the needs of my child are the most important to me” …. while I completely
agree with this statement, I find it equally important be supportive of my wife.... so “most
important” might be skewed because of these things.; :-)” (P7, baseline). One father identified as
a father with knowledge about parenting interventions, “I facilitate a dads group for a pregnancy
resource centre, and have found preparing for the group to be extremely enlightening. I am also
on parental leave from work for the next 6 months, til October 2018” (P2, baseline).

One father commented about his sense of efficacy regarding father involvement. “I feel
less involved with every subsequent child but I feel more capable and less stressed at the same
The DadRocks Study

time. This is also the first kid that I have not taken immediate paternity leave as mine starts next month.” (P7, six month).

One father provided a long comment, including that the study made him concerned for his baby’s development: “I didn’t like that some of the developmental stuff was beyond my baby’s current capability. Even if it’s true, I don’t like thinking she’s behind.” ?? who said this?

Overall, these messages provided useful information for future revisions to the messages.

**Father infant interaction**

The main goal of the messages was to influence fathers to positively interact with their infants. Father-infant interaction was measured using a 23 item Father-Infant Interaction scale (L. A. Rempel et al., 2017). See Table 11, 12, and 13 for the t-test output for the three timeframes.

For the overall father-infant interaction score, there was a significant increase between baseline \( M_{\text{baseline}} = 3.50, SD = 0.67 \) and three-month follow up \( M_{\text{three month}} = 3.93, SD = .471 \); \( t(12)=-2.991, p = .011, d = .743 \). There was also a significant increase between father-infant interaction at baseline \( M_{\text{baseline}} = 3.53, SD = .67 \) and the six-month follow up \( M_{\text{six month}} = 4.03, SD = .51 \); \( t(8)=-2.492, p = .037, d = .84 \).

For the play subscale, there was a significant increase between baseline \( M_{\text{baseline}} = 2.69, SD = 1.05 \) and the three-month follow up \( M_{\text{three month}} = 4.08, SD = .60 \); \( t(12)=-5.806, p < .001, d = 1.625 \). The subscale of play was again the only subscale that was significantly different between baseline \( M_{\text{baseline}} = 2.75, SD = 1.19 \) and six-month follow up \( M_{\text{six month}} = 4.40, SD = .52 \); \( t(8)=-4.341, p = .002, d = 1.797 \).

There were no significant differences between overall father-infant interaction or play when comparing the three- and six-month timepoints.
The DadRocks Study

There was a trend to an increase in the subscale of care between the three-month
\((M_{\text{threemonth}} = 3.40, SD = .53)\) and six-month follow up \((M_{\text{sixmonth}} = 3.60, SD = .71); t(8)=-2.204, p = .059, d = .319).\)

**Father infant relationship attitude**

There was no difference between time points for attitude towards father-infant involvement.

**Father-infant attachment**

There were no differences on the overall attachment scores or in the subscales of Absence of Hostility, Quality of Interaction, and Pleasure in Interaction for any of the time point combinations.

**Perceived behavioural control (PBC)**

There was no difference in Perceived Behavioural Control between any time points.

**Couple relationship quality**

Couple relationship quality was measured using the scale from Gere and MacDonald (d2013). Couple quality was poorer between baseline \((M_{\text{baseline}} = 9.24, SD = .43)\) and six-month follow up \((M_{\text{sixmonth}} = 8.80, SD = 0.61); t(8)=2.848, p = .022), d = -.834. There was a trend towards a decrease at 3- months compared to the baseline \((M_{\text{baseline}} = 9.18, SD = .55, M_{\text{threemonth}} = 8.92, SD = 0.66); t(12)=1.923, p = 0.08). There was no significant difference between the three and six-month time points.

**State trait anxiety index**

There was no difference in anxiety between any time points.
The DadRocks Study

Correlations between study variables

Pearson correlations were run between the study variables collected at the three-month time frame. As a reminder, father-infant interaction was comprised of subscales of care, play and affection. Attachment was comprised of absence of hostility, quality of interaction, and pleasure in interaction.

There was a significant positive correlation between father-infant interaction and many variables. The significant correlations with the total father-infant interaction scale include the subscale of care, \( r(15) = .893, p < .001 \), play, \( r(15) = .859, p < .001 \) affection, \( r(15) = .885, p < .001 \). Father-infant interaction was also related to pleasure in interaction, \( r(15) = .719, p = .003 \), and attitude, \( r(15) = .567, p = .028 \). These are all large effect sizes. There was a trend for a correlation between father-infant interaction and overall attachment, \( r(15) = .459, p = .085 \).

For care there was a significant correlation between play \( r(15) = .572, p = .026 \), affection \( r(15) = .658, p = .008 \), attachment, \( r(15) = .542, p = .037 \), and pleasure in interaction, \( r(15) = .670, p < .001 \).

There was a trending correlation between care and perceived behavioural control (trend), \( r(15) = -.456, p = .087 \), and quality of interaction (trend), \( r(15) = .497, p = .059 \).

For play, there was a significant association with affection, \( r(15) = .790, p < .001 \), pleasure in interactions, \( r(15) = .523, p = .045 \), and attitudes, \( r(15) = .552, p = .033 \).

For affection, there was a significant association with pleasure in interaction, \( r(15) = .708, p < .003 \), and attitudes, \( r(15) = .567, p = .028 \).

For attachment overall, there was a significant correlation with its subscale items absence of hostility, \( r(15) = .592, p = .02 \), quality of interaction, \( r(15) = .928, p < .001 \) and pleasure in
interaction, $r(15) = .782, p < .001$ There was also a relationship between attachment overall, and
couple relationship quality, $r(15) = .568, p = .027$.

For quality of interaction, there was a significant association with pleasure in interaction,
$r(15) = .701, p = .004$, and couple relationship quality, $r(15) = .662, p = .007$. There was a trend
for a correlation between quality of interaction and perceived behavioural control, $r(15) = -.478$,
$p = .072$.

Correlations were also done to analyze the father’s satisfaction with the study and the
measures of father involvement collected at the three-month mark. Table 14 presents the
correlations at three months, and table 15 presents the correlations between outcome measures
and satisfaction with the messages.

When the fathers were asked about their overall study satisfaction with the question “I
felt the study overall was interesting to complete,” there was an association with increased
attitudes to father involvement, $r(14) = .561, p = .037$, and a trend in absence of hostility
towards their infant, $r(14) = .478, p = .084$.

There was significant correlation between message satisfaction score (aggregate of all
scores, higher is more negative) and affection, $r(14) = -.601, p = .023$, and attitude to father
involvement, $r(14) = -.634, p = .015$.

For the individual questions, there was significant correlation between the question “I am
reading the messages and doing the activities with my infant” and the father-infant interaction
affection subscale, $r(14) = .612, p = .02$, attitude, $r(14) = .615, p = .019$ and a trend for a
correlation with perceived behavioural control, $r(14) = -.479, p = .083$.

There was an association between “I used the suggested resources (e.g. Parent Talk Line,
links to websites) when I was unsure of something,” and anxiety, $r(14) = .647, p = .012$. 
The DadRocks Study

There was a trend towards an association between the question “I used the suggested resources (e.g. Parent Talk Line, links to websites) when I was unsure of something.” and absence of hostility to the infant, $r (14) = -.482, p = .082$.

**First time fathers**

As the original plan was to not include fathers who had older children, a post-hoc test was run to test if there was a difference in the results for fathers who were first time fathers (n=10). Analyzing only fathers who were first-time fathers, there was a difference in father-infant interaction between baseline ($M_{\text{baseline}} = 3.44, SD = .47$) and 3 months ($M_{\text{threemonth}} = 4.03, SD = .45$), $t(7) = -4.309, p = .004, d = 1.282$, and between baseline and 6 months ($M_{\text{baseline}} = 3.26, SD = .39$ & $M_{\text{sixmonth}} = 4.02, SD = .32$), $t(4) = -6.90, p = .002, d = 2.131$. For the subscale play, there was a difference between baseline ($M_{\text{baseline}} = 2.30, SD = .68$) and three-months ($M_{\text{threemonth}} = 4.09, SD = .60$), $t(7) = -7.304, p < .001, d = 2.791$ and baseline and 6-months ($M_{\text{baseline}} = 1.94, SD = .45$ & $M_{\text{sixmonth}} = 4.40, SD = .41$), $t(4) = -10.39, p < .001$.

There was also a trend for a decrease in the father-infant interaction affection subscale between baseline ($M_{\text{baseline}} = 4.52, SD = .45$) and three-months ($M_{\text{threemonth}} = 4.36, SD = .50$), $t(7) = 2.049, p = .08, d = -.336$, and absence of hostility between baseline ($M_{\text{baseline}} = 3.88, SD = .28$) and three-months ($M_{\text{threemonth}} = 3.67, SD = .39$), $t(7) = 2.047, p = .08, d = -.619$.

There is a trend toward a difference for couple relationship quality ($M_{\text{baseline}} = 9.28, SD = .39$ & $M_{\text{sixmonth}} = 8.64, SD = .69$), $t(4) = 2.713, p = .053, d = -1.142$. Between 3 and 6 months, there was a significant difference in the attachment subscale – pleasure in interaction ($M_{\text{threemonth}} = 4.08, SD = .27$ & $M_{\text{sixmonth}} = 4.28, SD = .27$), $t(4) = -3.162, p = .034034, d = .741$.

There were significant correlations between variables at three months. Table 17 provides the specific details of these correlations. There were significant positive correlations between
The DadRocks Study

interaction, with care, play and affection. Fathers who reported higher attachment reported more care. Fathers who were more attached had higher pleasure in their interaction, and fathers who reported higher quality in their interaction with their infant had greater couple relationship satisfaction.

Table 17 provides the correlations between the main study measures and intervention satisfaction for first time father. Fathers who reported higher anxiety reported they used the resources more \( r(8) = .720, p = .004 \). There were multiple trends. There was a trend for fathers reporting anxiety and referring to the messages if they were unsure of something, \( r(8) = .653, p = .079 \). Fathers who reported using the suggestions in the text messages had a trend towards more care \( r(8) = -.650, p = .081 \). Fathers who were satisfied with the messages overall had a trend to a more positive attitude towards caring for their infant, \( r(8) = -.663, p = .081 \).

**Fathers with older children**

For the six fathers with older children, there were no differences in the t-tests on study variables over time. There was a trend over time for a difference in the state and trait anxiety index (STAI) \( (M_{\text{baseline}} = 24.0, SD = 4.35 & M_{\text{threemonth}} = 20.67, SD = 4.94), t(4) = 2.236, p = .089, d =-.715 \), and play \( (M_{\text{baseline}} = 3.31, SD = 1.32 & M_{\text{threemonth}} = 4.06, SD = .66), t(4) = -2.25, p = .088, d = .719 \).

There were correlations between study variables for fathers with older children. These correlations can be seen in Table 18. Fathers with increased couple relationship satisfaction showed more interaction and greater attitudes towards their role as a father. Fathers who reported more anxiety showed more care. Overall attachment was related to the quality of interactions.

There were significant correlations across message satisfaction and variables for fathers with older children. This data is presented in Table 19. Fathers who liked the intervention had
The DadRocks Study

more overall attachment, pleasure in interactions, and attitudes. If these fathers reported that they were reading the messages and doing the activities, there was more affection and attachment. Higher perceived behavioural control was related to greater overall attachment.

**Information Dissemination**

The data was summarized into an infographic for participants and general audience use (see Figure 5). This will be emailed to participants who have completed the study, and shared on Facebook, and Twitter after the defense.
The DadRocks Study

Chapter 5: Discussion

In this chapter, I will discuss the results of the DadRocks Study within the context of current literature. I will also discuss changes to the study design, limitations to the study, and future directions.

This study was designed to determine fathers’ perceptions regarding the intervention, and whether the intervention could positively affect beliefs and behaviours. It examined whether the minimalist intervention of sending text messages to fathers would improve fathers’ measures of beliefs about how they should be involved, and their father-infant interaction behaviours. The intervention was adapted from the calendar component of the Saving Brains Vietnam project. Fathers who chose to participate in the study received 99 text messages over their infant’s first six months of life, and fathers completed online questionnaires at baseline, 3- and 6-months.

Intervention satisfaction

Because this was a feasibility study, it was important to assess if fathers liked the interventions, and if satisfaction with the intervention would be associated with their behaviour. The fathers reported that they were happy with the intervention overall. Several of the fathers’ open-ended responses also indicated liking the study. Others also expressed that they were not sure of the goal of the study, but still supported the study as they got to tell someone about their baby. Most fathers provided thoughtful feedback in the open-ended questions, including suggestions for future research, such as asking for less obvious tips, or making messages appropriate for fathers with more than one child.

Message satisfaction

Fathers reported that they somewhat liked the messages and provided positive feedback on the messages. If fathers were reading the messages and doing the activities, they reported
The DadRocks Study

more affectionate behaviours, had a more positive father involvement attitude, and had higher perceived behavioural control regarding their ability to be involved with their infants. Greater overall message satisfaction was related to more positive attitude to father-infant involvement and greater father interaction, especially in terms of the affection subscale. Without an experimental study that uses a control group, it is not possible to be certain of the cause of these relationships. There is research that suggests that a person’s behaviour influences their attitude (Eagly & Chaiken, 1993), which would support the possibility that fathers who were more involved liked the messages because they were already involved. However, the possibility that positive attitudes toward the intervention messages changed fathers’ involvement is consistent with the hypothesized effect of the intervention. The Theory of Planned Behaviour (Ajzen, 1991) suggests that the knowledge from the messages should create more positive attitudes towards father-infant involvement, should increase PBC, and should increase father-infant interactions. Thus, it is possible that fathers who had more positive attitudes towards their role as a father felt the messages were more appropriate, or it could be that the positive feelings towards the messages changed their behaviour. There were many other correlations that were large, but not significant.

Some fathers reported that they did not feel the messages were useful. One father stated that the messages were not thought-provoking and were demeaning. As this was designed as a universal study, and some messages were based on other interventions, it was expected that these messages would be appropriate. The messages were adapted from the Vietnam project (L. A. Rempel et al., 2017) and other research studies (Appendix A includes the messages, and the source for the content). The Vietnam project was designed for fathers with potentially more limited involvement and included fathering groups and visits from doctors or nurses to discuss
The DadRocks Study

The messages in the calendar. In the DadRocks study, and without the in-person interventions, the messages may not have been salient enough for fathers in North America, who are typically somewhat involved (e.g., Dayton et al., 2016). Although these messages were reviewed by the thesis committee and two fathers, there may not have been content that was relevant to all fathers. Given that both fathers who reviewed the messages were well-known to the author, they may not have been able to provide suggestions that had not already been identified. Perhaps this intervention would be more beneficial with modified messages based on the feedback from more fathers.

In a newly published paper, researchers ask paternal health care providers what messages new fathers should receive (Aqil et al., 2019). These include information about care for the infant, and care for their spouse. For the care of their infants, they suggested messages on feeding, sleep, and age appropriate play, which were topics covered in the DadRocks messages. They also suggest signs of infant illness, impact of drug use, verbal stimulation, and doctors’ appointments (Aqil et al.), which were not covered in the DadRocks messages. In terms of care of their spouse, the DadRocks messages encouraged support of partner breastfeeding, but Aqil et al. also suggest messages on doing regular check-ins, parenting styles, shared responsibilities, warning signs of maternal depression, hopes for infant, action to support partner physical health.

The request for more information was also seen in the fathers’ comments, such as “Less obvious tips,” “… (I could use less basic messages, more ideas of games to play with my daughter)” and “More tips of how to interact with baby, please.” There were a few messages about play, such as finding a favourite toy, and how to know the signals when baby wants to play, but possibly more specific suggestions and activities the fathers can do with their infants are needed. Many messages were statements more than action items, so including specifics of
The DadRocks Study

how some fathers incorporate that information into their daily care routines could be beneficial. Using the new research by Aqil et al. (2019) could help to expand the messages used for future interventions.

Some of the DadRocks messages were very short, such as “Your baby learns to look forward to the time they get to spend with you!” One father suggested “Maybe more texts with practical suggestions “e.g., if your baby is doing X then try Y next.” Providing further details about this, such as other ways to spend time with the baby, could make the messages better received. Further research on the messages, including which ones fathers perceive as useful or not, would allow a better future intervention with messages targeted and tailored to specific fathers.

Including the father’s name, or the infant’s name in the messages could also be beneficial to ensure the fathers feel more engaged with the messages. I opted not to do this for a few reasons, including that it was not sure that the drip campaign could support this. Also, as I set up the system manually, there was a small chance of sending a child’s name to the wrong participant. Other text messages services may be able to support this.

One father in the study said he used the messages to discuss parenting with his partner. Fathers should be encouraged to initiate discussion with their partners before the baby arrives, as fathers who were involved prenatally (by discussing pregnancy with their partner and attending doctors’ appointments) were more involved with their children longer than if they were not involved prenatally, even if they were present at birth (Shannon, Cabrera, Tamis-Lemonda, & Lamb, 2009). No messages were sent to fathers before the infant was born, to ensure all fathers in the study received the same messages. Some fathers signed up after their infant was born, and one signed up the day they found out they were pregnant, so there would have been too much
The DadRocks Study

variance in the number of messages they received, and the baseline surveys would have needed
to be slightly different, such as using the prenatal attachment scale verses the postnatal
attachment scale (Condon, 1993; Condon et al., 2008). However, messages before the infant is
born would allow the mother and father to discuss ideas, such as parenting styles, before the
immediacy of the needs of an infant. It could also provide links to community resources before
parents are in crisis. For example, one father said “Home birthing went great, after my wife had
to go to the hospital and get a blood transfusion. She was hardly able to move and the bedside
manner at the hospital was bad, along with being awake for 24 hours straight we where [sic] both
emotionally and physically worn out. I feel more care should have been seen to both my wife
baby and me.”. While the intervention could not address hospital bedside manner, nor could it
address the variations of normal in delivery, teaching fathers self-efficacy methods to
communicate their needs could help them ask for what they need (Demontigny et al., 2013).

A downside of one-way communication is the messages cannot be buffered based on the
needs of the fathers. For example, one father said that he was concerned about his infant’s
development after reading the messages. The messages about development were based on
literature. However, without being able to provide background context and normal ranges
associated with developmental milestones, they could cause concern if a child did not appear to
be meeting some milestones. It was hoped the fathers would use the messages to talk about
development with their health care providers, but this may not have been clear to the fathers.
Providing more information about how to talk to their health care providers about concerns could
be beneficial. The study that the DadRocks intervention is based on in Vietnam also included
interaction with resource people until the baby was 3-months old (L. A. Rempel et al., 2017), so
this text-only intervention may need another layer of intervention with the fathers.
The DadRocks Study

When I discussed my research topic with fathers of older children, they all expressed interest in the thought of an intervention for fathers. Therefore, it was disappointing how few fathers signed up for the study. One possibility is that the narrow time window in which fathers would have to sign up for the study (e.g. the first few weeks of the father’s birth) was a cause of this. It may be that this time would be hard to add the responsibility of participating in a study. It is a time of major change, i.e., the transition to parenthood, sleep deprivation, changes in identity from husband to father, and going back to work after possibly being off from work for a week or two. Fathers would be using a lot of their energy just to support their infant and partner, so adding a study that they may not know much about, or may be concerned about time requirements, could be too much to ask. Therefore, having the messages continue for a longer time, and fathers able to begin the study at any time, could allow more fathers to participate. One father said “I’m really enjoying the study. I’m glad it keeps going for another three-months. Thank you!”

This study was limited to the first six months based on the time constraints of a master’s program. The content of the father-infant relationship calendar in Vietnam continued to 12 months with home visits from a doctor or nurse until 3-months (L. A. Rempel et al., 2017), but including home visits was also not feasible for this project. Messages that extend for the first year, and that allow fathers to begin receiving messages any time within that first year could be an option. One study has found that fathers and mothers are equally important to development at 7 months, but by 24 months, the specific effect of the father is becoming greater (Towe-Goodman et al., 2015). If rolling starts were used, messages would need to be adjusted to ensure these fathers receive the foundational messages that were sent early in the study, such as “You are the expert on your baby – learn methods that work best for you and your family!”
The DadRocks Study

It was thought that if the fathers received their messages when they were home with their children, they would be able to act upon the messages, especially those with activities for the father to do with their infant. All messages were sent at 6 pm. This was done to ensure the fathers were home and with their children. A future direction could be to ask fathers their preferred time and send the messages at the time that worked for them, but this was not an option in the text service used. It is possible that if fathers received messages at the time they were interacting with their infant, the message may have discouraged their involvement, had the fathers paying more attention to their phone. Possibly sending the messages after the child has gone to bed, so the father can think about how to implement the suggestions into their lifestyle could be a future plan.

Study Variables

That the fathers liked the intervention and generally liked the messages is promising. It is also very promising that several study variables showed change between time points, with a strong effect.

Play

Consistent with the hypothesized effect of the intervention, there was an increase in the fathers’ interaction with their infants, as measured by the Father-Infant Interaction scale, between the baseline and the 3-month follow up. When we explored this further, the increase in father-infant interaction was mostly due to increases in the amount fathers reported playing with their infants. This is a promising result. The fathers that chose to be in the study were likely fathers who are highly involved to begin with, so seeing a change over this time may mean that they were getting more involved. It is not surprising that play increases as the infant ages, but the questions about play were things that can be done with very young infants, such as how often do
The DadRocks Study

you “Play during bath time” or “Entertain your baby with baby toys (e.g., rattle, ball).” (L.A. Rempel et al., 2017). Fathers were sent messages encouraging play throughout the study. In the first month they were sent: Play will tell your baby that you like to be with them. If you are having a play session with your infant, you can know when your baby is tired of interacting because they stop looking at you.” In the second month, they were sent “Did you know: Fathers play a special role in the development of exploration and active play. While your infant is still young, you can encourage learning by taking them for walks in your neighborhood!” These messages, along with others, encouraged fathers to be involved in play, even when the infant is very young.

The difference in play between mothers and fathers has been well studied in older children. However, there is debate about if there is a difference between their maternal and paternal roles and play. Some researchers feel that there is no difference, and others feel that there is. If play is divided into pretend play and physical play (rough and tumble) (Majdandžić, 2017), fathers have been found to engage more in rough and tumble play that can encourage risk taking (Cabrera, Fitzgerald, Bradley, & Roggman, 2014). They have also been found to tease more (Cabrera et al., 2014). In a study on play in children 1-3 years of age, Menashe-Grinberg & Atzaba-Poria (2017) found that there was no difference in playfulness between mothers and fathers. These family differences between mothers and fathers and how they play with their children can be based on individual differences, biology, family structure, and cultural beliefs (Cabrera et al., 2014). Fathers who reported more play also reported more affectionate and care behaviours, more pleasure in their interactions with their infant and more positive attitude regarding father-infant involvement. This highlights the important relationship of fathers play
The DadRocks Study

with their infant, and that giving suggestions to fathers about play may change the importance
they place on their role.

There is also the discussion of if play should be measured by observation, or by
questionnaires (Majdandžić, 2017). The benefit of observation is it can show the quality of the
play, but it cannot show the frequency of this play in the natural family environment
(Majdandžić, 2017). For the DadRocks study, designed to be a minimalist intervention,
questionnaires were the only option feasible – although even fathers in the study suggested that
we do observational studies! This suggests that they want feedback on their behaviour. This was
not within the scope of the study. The scale that was used was developed based on a Southern
Ontario qualitative study on father involvement (L. A. Rempel & Rempel, 2011) and was used in
the Saving Brains Vietnam study (L. A. Rempel et al., 2017). Formal psychometric evaluation of
this scale has not been done in the DadRocks study, but the interaction scales demonstrated
expected changes over time and expected correlations between subscales and with other study
variables as some evidence of the construct validity of the scale.

Attitudes

The intervention was designed to change fathers’ knowledge about interacting with their
infant through the SMS messages. Fathering attitude was expected to be affected by this change
in knowledge. Fathering attitude did not change over time. That may be because of the small
sample size, or because the questions that were used were developed for the father-infant
interaction study conducted in Vietnam and did not capture the important aspects of Canadian
fathers’ attitudes regarding interacting with their infants. However, attitude was found to be
related to multiple measures, such as behaviour as measured by father-infant interaction. This is
consistent with what was hypothesized with the Theory of Planned Behaviour. While this was
not experimentally tested in our study, it shows promise that this intervention can impact fathering attitudes, and in turn, fathering infant interactions.

**Relationship satisfaction**

There is often a decrease in couple relationship satisfaction during the transition to parenting (Lawrence, Rothman, Cobb, & Bradbury, 2010; Trillingsgaard, Baucom, & Heyman, 2014). However, couples who are encouraged to use a teamwork approach to parenting can show less decline in this couple relationship satisfaction (e.g. J. K. Rempel, Rempel, Hoa, Vui, & Long, 2019). In the DadRocks sample, there was a decrease in couple relationship quality between baseline and six-month follow up, most of which happened between baseline and 3 months. The Saving Brains intervention on which the current study was modeled, provided messages at multiple levels of change – including individual, relationship and community levels (L. A. Rempel et al., 2017) and resulted in an increase in couple relationship satisfaction among intervention fathers in comparison to a decrease among control fathers. The DadRocks minimalist intervention may not have been enough to ameliorate the usual decrease in relationship satisfaction. Without a control group, it cannot be known if this decrease would have been bigger in those who did not receive the intervention. One of the father’s comments discussed that the messages allowed him and his partner to discuss their relationship. It is inspiring that he used the messages as a way to discuss parenting, even though he didn’t find the specific messages useful. The comment suggests that this minimalist intervention may benefit the couple relationship satisfaction at this transition to parenting.

**Mental health**

Some fathering programs focus on healthy relationships, not only with their romantic partner, but also for the father themselves. Depression in fathers may be as high as 10.4 %, and
The DadRocks Study may increase from 3-6 months to 25.6% (Paulson & Bazemore, 2010). Fathers’ mental health concerns can affect the family at multiple levels. If fathers have poor mental health, they report decreased couple relationship satisfaction (Price-Robertson, Baxter, & Mathews, 2017). Fathers with anxiety shortly after birth may have children with behavioural difficulties at 3.5 years (Ramchandani et al., 2013). For the DadRocks study, father’s anxiety was assessed using the STAI, and there were no differences over time. However, in the correlation data, fathers who reported higher anxiety used the suggested resources. The questions did not assess which resources they used, but these included links to credible websites and parenting phone lines. This is interesting to explore in future work, as fathers who feel anxious may benefit from these resources, and it is an easy way to provide information to them. A future iteration could include messages about emotion coaching, and self-care suggestions (Osborne, Dillon, Craver, & Hovey, 2016) and resources available in the community to fathers for this. Future messages could also include specific information about post-partum mood disorders such as symptoms to watch for and resources available if there is a concern.

Peer to peer

Social support, even if virtual, can have positive benefits on father engagement (Bennett et al., 2017; Gilmer et al., 2016). Although there is research on the benefit of minimalist interventions (Armanasco et al., 2017), some fathers also asked for more intensive interventions. This means that some fathers want a level of interaction with other fathers. This may be that they want a space to talk about fathering. This could mean that this minimalist intervention would not be enough for them. Two fathers suggested having fathers meet, but one said “Force dads to meet each other and talk about it - that is something that never happens. You have baby talk groups with moms...but I wasn't aware of any for dads. I'm also not sure as to how many dads
The DadRocks Study would be motivated to go.” The term “force” is interesting. It would be unethical to force people into participating in a study, and it would be unlikely that they would feel positive towards the intervention, and be intrinsically engaged. The challenge recruiting to this study suggests that it might also be difficult to engage fathers via in-person groups. Others have found it hard to engage fathers in programming (Axford et al., 2012) and I have also experienced difficulties engaging fathers with Life with a Baby events. It may be hard for fathers to attend events without the mother, if the baby is exclusively breastfed.

Having virtual meetings or online engagement may decrease the logistical concerns of this. Having a secret Facebook page would allow fathers to provide peer-to-peer support, in a moderated space. Some research shows that for individuals who have high social anxiety, Facebook social support increased their subjective well-being, better than social support (Indian & Grieve, 2014). One father suggested “Maybe more texts with practical suggestions “e.g., if your baby is doing X then try Y next.”. With a Facebook group, a moderator could ask for ideas about what fathers could try next if the baby is at a particular developmental stage. Fathers could ask for suggestions from the moderator or other fathers for what to try next. It is possible that an online/ peer to peer forum, either through social media or through a website may be a more engaging way to change their behaviours. Based on the advice of fathers, asking for more intensive interventions, having online workshops, or group meet ups may be beneficial.

First time fathers and fathers with older children

Fathers who had other children were also included in the study when recruitment did not go as planned. This could have reduced the saliency of the intervention, as these fathers have established their role as father, and would need help transitioning to be a father of multiple children. This was mentioned a few times in the fathers’ comments – that they wanted to learn
The DadRocks Study

ways to integrate the infant into their family dynamics. That they took the time to continue the study and provide the feedback, implies that the intervention was relevant to them, but could be made more relevant by expanding messages based on the family composition.

One father expressed that the messages and the questions are appropriate for the infant, but didn't address the balance of his role as a father to multiple children. Fathers who had older children asked for messages specific to their older children such as how to integrate the new baby into their life and family, e.g. “Information for integrating new baby into a family with children already, ie. a second, third, etc. child.” From the children’s perspective, the transition to siblinghood can either be a time of disruption, or a time with no noticeable changes. Volling (2012) found that when fathers with an older child were more involved in that child’s care, the firstborn’s attachment relationship was improved (Volling, 2012). It is also clear that the behaviours around fathering for fathers with other children are different than those of first-time fathers, as noted in the quote “I feel less involved with every subsequent child but I feel more capable and less stressed at the same time.” Creating further messages around this role and supporting fathers of more than one child could show benefit, as they are interested in participating and providing feedback and are clear that the messages should include information about integrating the baby into their family framework.

The fathers of older children still showed significant correlations, such as that those reporting more affectionate behaviour showed more quality and pleasure in interaction. Experienced fathers who read the messages reported more affectionate behaviour and more positive attitudes, and if they enjoyed the messages they reported more positive attitudes. This was consistent with the full sample of fathers. There were other correlations which were large, but not significant. Even doubling the sample size could make these correlations reach
The DadRocks Study

significance, and if only first time fathers were included, it is likely that less than double would result in additional statistically significant effects.

First time fathers who had more positive attitudes indicated more care behaviours, improved quality of their couple relationship, and increased pleasure in their relationship with their infant. Fathers without older children showed more positive attitudes if they were satisfied with the messages, more care behaviours if they used the messages, and more positive attitudes if they found the study interesting to complete. If first time fathers reported higher scores on the anxiety measure, they also reported higher scores on the question about referring to contents in the messages, and liked the study more. First time fathers are perhaps a little more likely to benefit from reduced anxiety due to an intervention like DadRocks.

Cell phone use

To ensure that fathers who were included in data analysis used their cell phones and to ensure they were receiving the messages in a timely fashion, we asked about their cell phone use. If they did not use their phone (as one participant reported) they would be excluded (as was done). Fathers reported that they carried their phones with them often. Although there was some variation, most fathers reported the same level of cellphone use throughout the study, although five fathers reported a decrease in cellphone use between 3 and 6 months. This could be a reporting fallacy. However, the questions may have drawn their attention to how often they were using and carrying their phone, so their actual use may have decreased, or they may have attended better to their actual use and reported it more accurately in the 6-month survey.

As of 2015, 88% of people have a cell phone (CRTC, 2018). The CRTC report did not include the frequency at which those people used their cell phone. However, this information infers that text messages may be a viable way to reach people. Some people do not have a cell
The DadRocks Study

phone, so another option could be emailing messages to participants. We decided not to do that in the DadRocks study to ensure those without data plans could access the messages. Another option would be to allow participants to receive the information via text message or email, but that would require two separate web communication systems.

Limitations

Recruitment was harder than expected. It was thought that recruitment would be easier as DadRocks was an intervention designed to not be time intensive. Despite numerous methods used to recruit fathers, only 25 people contacted us and only 17 participated the study. The DadRocks intervention was designed to be a universal intervention, so likely attracted fathers who had more experience and expectations about being an involved father. It can be difficult to get parents to engage and attend parenting programs (e.g. Axford, Lehtonen, Kaoukji, Tobin, & Berry, 2012; Whittaker & Cowley, 2012) so a universal program, that would allow for a larger participant recruitment was chosen. The NRPH released the Mom+Baby2B app in 2015 (Swanson, Braun, & Broski, 2014). This app release, which was fully funded by a grant that NRPH won, and was created by a professional app development team including researchers to guide the process, experienced challenges such as few women knowing about the app (Dupuis, Braun, Beaudoin, & Swanson, 2016). For the DadRocks project, without funding, and a single researcher, advanced app development was not possible. It may be that parents are slow to use any new intervention and that uptake of the intervention would improve over time. Alternatively, it may be that they felt the SMS messages could not meet their needs.

Fathers in North America are, especially at a universal level, are already very involved, and their involvement has been increasing since 1965 (Osborne et al., 2016). Fathers who would voluntarily sign up for a study are likely to want to be involved fathers. In a study on web-based
The DadRocks Study

interventions on heart disease risk factors, the authors used Intervention Mapping, which allowed them to create performance and change objectives for each participant (Sassen et al., 2012). The generic messages in the DadRocks study may not be enough to change all the behaviours in the measures that were assessed, and individualized messages could make this more appropriate for fathers, for example those of older children. The changes in the Vietnam sample were clear – there was a previous low amount of parenting done by those fathers (L. A. Rempel et al., 2017), and this is not usually the case in Canada. Having a control group would allow the intervention to be tested so that it can be determined if the changes that occurred over time were due to the intervention or the changes that occur naturally over time. Despite having a limited sample, large effects were found between many variables. If the sample included fathers who were less involved before beginning the study, it might be expected there would only be modest correlations for that sample, but these would still likely be large enough to be important.

Fathering happens at multiple levels including the individual, the couple, family and friends, and at a community level (L. A. Rempel et al., 2017). This program only targeted fathers at an individual level. This minimalist intervention does show promise, and future plans to target father involvement at a community level could increase warm and caring father involvement even more and ensure better outcomes for children. As stated before, the fathers in the study were already involved in their infant’s life; having community interventions such as fathering groups or events where fathers can interact with other fathers, could work to engage fathers who may be having a hard time getting involved in their infants care. Events that go beyond simple meet ups, with aspects of teaching about attachment, and methods to foster the attachment could benefit the family (Nosraty et al., 2019).
The fathers who volunteered for the study were well educated, employed, and in a high-income bracket. One father was clearly trained on parenting studies, providing suggestions such as video-taping the interactions. Many of the fathers had completed prenatal classes. This may mean that these fathers were looking for more ways to be involved, and the basic content was not enough details for them. One father suggested “Find a way to make the text messages interactive”. An interactive intervention would accommodate this, being able to provide time-sensitive and content specific information. The proposed online component could also support that, by having messages available in the forum, for fathers to comment on, and allowing interaction between other fathers.

It is felt that the limited number of significant results in this study is related to the small sample size, the inclusion of fathers with more than one child, and the messages being not suitable for fathers with older children or for fathers who know about child development. There were correlations that were over .40 but not significant, such as that between father-infant attachment and involvement, couple satisfaction and the attachment subscale of pleasure in interaction, couple satisfaction and father-infant caretaking ($r=.41, p = .127$). Doubling the sample size could make correlations over .325 significant (Polit & Polit, 2010).

**Appropriateness of the questions**

Some of the measures chosen for this study may not have been appropriate for this group. For example, one father provided the feedback that the dichotomous questions in the attachment scale did not capture his need to leave to go to work every day, and that he was not sad or relieved about it. Another father commented that “… For example, the try to make visits with baby longer or shorter. You have no “not change” option which I think will give you a falsely high “spend more time”. These questions from the attachment questionnaire have been used in
The DadRocks Study

other studies, with fathers over similar time frames (e.g., J. T. Condon et al., 2008). The questions were also implemented to look at changes over time, so it is assumed that fathers who answer one way at the baseline would not necessarily answer the same way at 3-months. Although it was not possible to assess the reliability of the scale with this small sample, the subscales were intercorrelated, which suggests good internal consistency in the scale. Also, there were correlations with other study variables in expected directions, which support the construct validity of the scale.

We did not ask fathers about their work, ability to work from home or paternity leave. A few fathers reported that they worked, so would not be spending a lot of time with their infants. One father did report being on paternity leave, but didn’t specify when it started. Another father reported that he worked from home, so was with the infant. During the course of the study, there were changes to parental leave in Ontario, where fathers were given more time to be with their infants (Scotti, 2017). This may mean that fathers who began the study before the change had less time to spend with the infants, possibly creating a different level of attachment than those who took a paternity leave. Future iterations could ask about fathers taking paternity leave or working from home, as it would change the amount of time they spend with their infant. Fathers were not asked about the amount of time they spend with their infant. Previous studies have assessed only time, but more recently there has been a focus to review the quality of the interactions (Robbins et al., 2018). The measures we used to assess our fathers focused on this quality of the interactions, as compared to just the amount of these interactions.

Types of Fathers

There were only a few cases of attrition in the study. This is interpreted as a positive finding for the study design, as those who signed up for the study did not ask to withdraw their
The DadRocks Study

participation. However, these cases of attrition decreased the already low sample size, so was not ideal. It is still promising that many analyses still had large effect sizes.

This intervention was designed with the aim of reaching many fathers as they transition to parenting. Fathers in this study were between 27-39 years old, and the average age for Canadian fathers at the time of their first birth was 28.3 years in 2011 (Statistics Canada, 2017). As this study included both first-time fathers and fathers with other children, this is within the expected range. The median income for Ontario in 2017 was $74,287 (Statistics Canada, 2012). Eight fathers in this study made over this amount, with five reporting making over $100,000, and three reporting making between $80,000 to 99,999. In the general population of Ontario, (not specified if male, female, or parents) 30.9 % of people have an education (trade certificate or college diploma) (Statistics Canada, 2006). In the study sample, 88 % of fathers did. This sample represents educated and employed fathers. This was designed as a universal study, so we chose not to target any types of fathers for recruitment or participation. We attempted to recruit young fathers by asking the facilitators running the Young Dads program in Niagara through Dad Central meetings to inform fathers of the study. As there were no younger fathers who signed up for the study, it is not known if the facilitators told the fathers about the study, or if the young fathers were just not interested in participating. Future studies could do targeted recruitment for the different age groups, or lower income fathers.

One father reported that he facilitates a group for fathers and had to do preparations for it. This likely would have involved obtaining information on father involvement. The resources he would have accessed to prepare for that would be more detailed than the information in this intervention, so it is expected that he might have increased his father-infant interactions more than those just receiving the messages. However, it was unclear when he facilitated this group. If
The DadRocks Study

it was during the study, he may have used some of the information towards the program preparation.

One father stated, “Study is geared towards father’s who are having trouble getting involved in their babies lives.” This was not the intention, as the DadRocks intervention was designed to be universal. Future studies could target fathers who are having trouble getting involved in their baby’s life and may show more pronounced benefits.

Sources of information

Fathers have asked for information geared directly to them (Niagara Region, 2017). To assess what information fathers are currently accessing, fathers in my study were asked where they would look for information. Most fathers had completed a prenatal class. They also reported that they would use books, parenting websites, videos, family members and social media. As expected, the fathers in our study were looking for other information, which could have reduced the saliency of the DadRocks messages. It was interesting that the responses changed over the three months. The number of fathers reporting that they would use parenting websites and social media stayed about the same, whereas reported use of family increased, and videos decreased. This suggests that providing credible websites was a good decision. We did not measure if the fathers used these websites, but that would be a good future direction. On the open DadRocks Facebook page, we provided links to resources, such as Niagara Parents through the NRPH. Having a closed Facebook page, with more resources available to fathers such as daily updates might be a good direction. It could allow for more of a safe discussion about topics, including emotionally charged topics such as vaccines. Having this page monitored by reputable sources, such as public health nurses, would ensure information is appropriate, and problematic responses are diffused or removed.
The DadRocks Study

**Recruitment Methods**

There was low enrollment into the study. It was thought that recruiting through public health nurses, who were building relationships with these families, would be a sufficient recruitment method. For future, the public health teams should be asked what barriers they experienced in assisting with recruiting, and work to resolve those. It may be that more time should have been spent going to where the fathers were, such as attending prenatal classes, breastfeeding classes, Well Baby clinics or other transition to parenthood events.

Nurses who work at NRPH were given presentations, and a summary of the program. More could have been done to contact local health care providers (HCP) e.g. OBGYN offices to assist in recruiting. Future variations of this study should do this, including having tip sheets for health care professionals about how to refer and engage parents (Axford et al., 2012). It should also include regular update and thank-you-letters to HCP, to ensure they are reminded to continue to recruit for the study.

**Control Group**

To determine if an intervention has an effect, a control group, preferably where participants are randomly assigned, is needed. It was the plan to have a control group in this study. The intention was that they would receive less insightful messages, possibly “Congratulations, your baby is 1 week old today!” This would have allowed them to have some engagement with the study, but not to the same extent as the intervention group. This was not feasible due to low enrollment. Having a control group for future studies would allow the ability to compare the intervention and control groups, which would determine if the intervention made a difference in levels of father-infant interaction as compared to normal processes such as child maturation. The control group in the Vietnam study increased their interaction, such that at 9
The DadRocks Study

months, their levels of father-infant interaction were the same as the intervention group (L. A. Rempel et al., 2017)

**SMS Messages vs. App**

The decision to send messages via SMS instead of an app are confirmed in a few ways. Deployment of an app may have provided more credibility to the intervention. It would also allow for the fathers to interact with the content easier – for example if there were links in the app of where to find more information, they could access it directly instead of having to go back through older messages. However, some people do not have reliable access to the internet. Only 87.4% of people report using the internet at home in 2015-2016, and in low income groups, this is only 65.2% (CRTC, 2018). Eighty-three percent of mobile subscribers (88% of the population) subscribe to a data plan (CRTC, 2018). Those in the low income, or do not have reliable home internet, may not be able to access this information. If an app is developed in the future, it should be done with offline capabilities, such that the app can be downloaded while they are in an area with reliable data connection, then does not need to be connected to the internet to access core information. This would mean the file size would be large and would use a lot of data to download, which may not be feasible for people on limited plans. Apps are generally designed to work in one platform and not another, so designing a cross-platform app would require extra funding to develop both types, which would be beneficial to allow the most uptake. Apps also have the concern of privacy – and require a password when launching the app. This was also done in the NRPH Mom+Baby2B app, and parents who used the app and discussed what they liked and didn’t like about it, reported not liking having to enter a password (Dupuis et al., 2016). This was done for security reasons but made accessing the app tedious. Having an app that doesn’t track participant information could avoid this issue. Alternately, if
basic information, such as the infants birth date is tracked, with minimal other identifying information, participants could be told to use a short password.

Conclusion

Fathers who are involved with their infants show benefits to their infants, their partners, and themselves. Text messages with research-based content were sent to 17 fathers, who answered online survey questions about attitudes, beliefs, involvement, their relationship with their partner, and about the intervention. Although recruitment was poor, the intervention was promising. My data suggest that an intervention with SMS providing fathers with suggestions of ways to support their infant and their partner was well received by fathers. Fathers reported that they liked the intervention, and their responses to the questions indicated that the messages were significant to them, especially for first time fathers. The fact that the study was conducted with a small sample, yet we found effects with large effect sizes is very promising. Fathers who had more positive attitudes towards father-infant relationship reported significantly more father-infant interaction. Father-infant interaction, especially play, increased between baseline, three months and six months. Fathers who reported more engagement with the messages had significantly more positive attitude and more affectionate behavior. Fathers with greater anxiety reported using more recommended resources.

The DadRocks intervention design was successfully adapted from a program delivered in Vietnam. This suggests that it can be further adapted for use in other regions. As there is minimal interaction required, this is also a potentially more feasible intervention design than other existing programs, as it can have an impact on fathers, infants, and couples, while not needing a full-time facilitator. As a universal intervention, it has the potential for significant impact if it was to be widely adopted. Based on fathers’ comments, future messages could include specific
The DadRocks Study

things to do with infants at certain ages, and possibly contingency statements, such as,
suggestions of how to engage the baby further if their baby is doing something new. Allowing
fathers to begin the intervention at any time would also be beneficial, as long as they were
receiving the foundational messages.

The DadRocks study is potentially significant as a minimalist method of communicating,
that can reach a lot of fathers, and with minimal resources, and a method the fathers in my study
liked to receive information. This pilot data supports the development of a more comprehensive
experimental study of DadRocks, with a large community sample that could help determine the
extent to which this low-cost intervention can improve father-infant relationships. Overall, this
study suggest that text messages may be a lost-cost way to communicate with fathers in ways
that promote and support positive paternal care.
The DadRocks Study

References


The DadRocks Study


The DadRocks Study

https://doi.org/10.1016/j.childyouth.2011.03.020

https://www.niagararegion.ca/living/health_wellness/pregnancy/prenatal/becoming-a-dad.aspx


The DadRocks Study


The DadRocks Study


https://doi.org/10.1002/14651858.CD004068.pub4


Carlson, J., Edleson, J. L., & Kimball, E. (2014). First-time fathers’ experiences of and desires
The DadRocks Study


https://doi.org/10.3149/fth.1203.242


https://doi.org/10.1080/02646838.2012.681966


https://doi.org/10.1111/j.1440-1614.2004.01298.x


The DadRocks Study


115
The DadRocks Study


The DadRocks Study


https://doi.org/10.1016/j.amepre.2008.09.040


https://doi.org/10.1016/j.beth.2015.05.008


https://doi.org/10.1037/fam0000245


https://doi.org/10.1111/pere.12001


https://doi.org/10.1016/j.ijnurstu.2016.03.015

The DadRocks Study


https://books.google.ca/books/about/Health_Behavior_and_Health_Education.html?id=1xUGErZCfbsC&redir_esc=y


https://doi.org/10.1016/j.evalprogplan.2017.04.001


Hoffman, J. (2011). Father factors. What social science research tells us about fathers and how to work with them, 62.


Indian, M., & Grieve, R. (2014). When Facebook is easier than face-to-face: Social support
The DadRocks Study


The DadRocks Study


The DadRocks Study

Vegethon: a theory-based mobile app intervention to increase vegetable consumption.


https://doi.org/10.1186/s12966-016-0400-z


https://doi.org/10.2196/publichealth.6949


https://doi.org/10.1016/j.ijnurstu.2014.06.009

The DadRocks Study


Panter-Brick, C., Burgess, A., Eggerman, M., McAllister, F., Pruett, K., & Leckman, J. F.
The DadRocks Study


https://doi.org/10.1001/jama.2010.605


The DadRocks Study


The DadRocks Study


https://doi.org/10.1037/0000099-000


https://doi.org/10.1016/j.pedn.2010.01.008

The DadRocks Study

Behaviors in College Students: A Preliminary Randomized Controlled Trial. *JMIR MHealth and UHealth, 5*(5), e67. https://doi.org/10.2196/mhealth.6638


The DadRocks Study


The DadRocks Study

https://www150.statcan.gc.ca/n1/en/subjects/income_pensions_spending_and_wealth

https://www.statcan.gc.ca/eng/dai/smr08/2017/smr08_218_2017#a1

Public Health Initiative-Niagara Region Specific-Ontario Friendly-Client Centred-
Educational-All-In-One Tool M+B 2B Weekly Download Tracker Pre-launch testing Target
Population M+B 2B Concept Approval and Funding. Retrieved from
M+B 2B (Mom and Baby to Be App).pdf


https://doi.org/10.1037/a0022635


The DadRocks Study

https://doi.org/10.1186/s12889-017-4426-1

https://doi.org/10.1037/a0026921


Zeno, T., & Kaplan, R. (2014). Social, Financial, Emotional and Biological Effects on Fathering:
The DadRocks Study

Table 1

*Summary of articles important to my research design.*

**Systematic Reviews (n=11)**

<table>
<thead>
<tr>
<th>Author, year, Country</th>
<th>Question</th>
<th>Area Studied</th>
<th>Population/ Targeted?</th>
<th>Search terms</th>
<th># articles</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scism &amp; Cobb (2017), US</td>
<td>current state of research</td>
<td>all research</td>
<td>fathers/universal</td>
<td>keywords bonding, paternal, father, infant, relationship, engrossment, and postpartum.</td>
<td>28</td>
<td>Father’s Adjustment and Transition, Variables That Influence Father–Infant Bonding, and Interventions That Promote Father–Infant Bonding.</td>
</tr>
<tr>
<td>Mountain, Cahill &amp; Thorpe (2017), UK</td>
<td>SR and meta-analysis of RCT to determine if early interventions are effective in improving attachment security</td>
<td>parents/universal</td>
<td>RCTs delivered to mothers, fathers, or carers, before child was 3 years, via 1:1 support, group work or guided self-help</td>
<td>4</td>
<td>- early interventions improve attachment security and improves rates of disorganized attachment.</td>
<td></td>
</tr>
</tbody>
</table>
The DadRocks Study

security and
parental sensitivity

**Bennett et al., 2017)**, Canada

- Universal social connectivity in transition to universal interventions that work, how best to foster these social connections, and enhance child development. Part of 2 other reports.

**Gilmer et al.** (2016), Canada

identify effective interventions parents/education universal to search 13 SR/

No one program or format effective at universal level. Issues: adult learning principles overlooked, theories of parent-child interaction were not used. No direct links between universal new-parent education programmes and child development outcomes. Reach, and
The DadRocks Study

parenthood period (population level)

programme attrition were key challenges. Evaluation reviews, 8 criteria were inconsistent, with an over-
grey reliance on parent satisfaction or self-
literature = reported intention to change behaviour.

72 papers Effective facilitators helped increase
parents’ perceived satisfaction

Panter- current How to best fathers/ parent* with 199 but not
Brick et al, approaches to engage parent universal (program or broken
research, intervention or engage down by
universal intervention, and father* father
policy to engage content, resource, and policy
universal with (program or
with fathers consideration in their design and delivery.

Conclusions:
### The DadRocks Study

| Bryanston et al (2013), not specified | structured postnatal education to individual or group, infant general health, care, and parent-infant relationships | Cochrane. Pregnancy and Childbirth Group’s Trials Register RCTs of any structured postnatal education provided to individual parents or groups of parents within 27 trials, 579 fathers, in many. Of 13, 4 had enough similarities to provide estimate of effect. Education about sleep enhancement, education about infant behaviour increased maternal knowledge. Details on research methods not reported |
| Nieuwboer, Fukkink, & Hermanns, 2013, Netherlands | Programs that are web-based may have benefits, but no review had been done before this online parenting intervention. 7 were adaptations of existing, twelve discussed the development of program, mother*, father*, child*, famil* or pediatr*, parental support (counsel*, coach*, support*, empower*, advice or train*), and the specific online context | parenthood (parent*, mother*, father*, child*, famil* or pediatr*), parental support (counsel*, coach*, support*, empower*, advice or train*), and the development of program, support (counsel*, coach*, support*, empower*, advice or train*), and the specific online context | 19 - seven | Statistically significant medium effect across parent outcomes and child outcomes, such that web-based programs allow to share social support, contact with professionals and training parental competencies. Guided and self-guided interventions benefit parents and children. |
### The DadRocks Study

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Title</th>
<th>Interventions</th>
<th>Goal</th>
<th>Target Population</th>
<th>Design</th>
<th>Methods</th>
<th>Implementation</th>
<th>Assessment</th>
<th>Study Type</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronte-Tinkew, Burkhauser &amp; Metz (2012), US</td>
<td>Which fatherhood interventions have promising practice and are effective in targeted populations?</td>
<td>Studies differ in their goals, target population, designs, and methods, and are rigorously evaluated.</td>
<td>Fathers/parents, parenting, targeted program(s), and fatherhood interventions.</td>
<td>ID 15 promising practices of successful programs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axford et al. (2012), UK</td>
<td>How to engage parents, and therefore evidence-based programs may not produce same results as efficacy</td>
<td>Lessons from literature on engaging parents; case study experience with the Incredible Years BASIC program.</td>
<td>Parents/“parent engagement+program” and “enrollment+parenting main program”; hand search messages.</td>
<td>Key recommendations: clear recruitment, communication between stakeholders, incentives for recruitment and retention, active outreach work, building relationships with parents, making programs easily accessible, having reasonable expectations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The DadRocks Study

<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Methodology</th>
<th>Participants</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>McAllister (2012), UK</td>
<td>What evidence-based programmes and interventions can benefit children? Targeted at family violence.</td>
<td>Review of policies and programmes to promote involvement of fathers; family violence, child abuse, children's health, learning outcomes.</td>
<td>Global North, Global South</td>
<td>The recommendations from the review are that fathers should be involved early on, programs should be universal (so they feel welcomed), and the facilitators should work based on the group’s needs, rather than just teaching the group. Programmes that target the community with advocacy campaigns produce better result. Best practice for Global South</td>
</tr>
<tr>
<td>Magill-Evans et al. (2006), Canada</td>
<td>Effectiveness of interventions on fathers</td>
<td>Interventions that were intervention studies, control group, pre-, post-test</td>
<td>Fathers - (1) father - fathers, (2) infants, (3) preschool child, child aged 0–5 years; targeted paternal behaviour, father–child relations, and parent</td>
<td>Active participation or observation of own child enhances father's interactions and positive perceptions of the child.</td>
</tr>
</tbody>
</table>
such as treatment,
programs, education,
prevention; and (4)
study type terms such
as controlled trials,
pretest, post-test,
random assignment,
and comparative
study.
The DadRocks Study

### Individual Interventions (N=6)

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study type/ question</th>
<th>What they studied</th>
<th>Population/ age of child</th>
<th>Sample</th>
<th>Design</th>
<th>Measures</th>
<th>Results</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rempel et al. (2017), Vietnam</td>
<td>RCT/ fathers as parenting team - early and exclusive breastfeeding, responsive interaction</td>
<td>Multifaceted multifaceted</td>
<td>Intervention</td>
<td>n(couple-control) = 403; follow up</td>
<td>Father-infant relationship</td>
<td>Knowledge increased from baseline, higher intervention = more attachment, knowledge. Infants showed greater motor, language, social-emotional development at 9 months.</td>
<td>Fathers in intervention = more attachment, knowledge. Infants showed greater motor, language, social-emotional development at 9 months.</td>
<td></td>
</tr>
</tbody>
</table>
The DadRocks Study

<table>
<thead>
<tr>
<th></th>
<th>affection FI - attachment</th>
<th>Interaction at baseline - Play development</th>
</tr>
</thead>
<tbody>
<tr>
<td>y communit</td>
<td></td>
<td>* small to large</td>
</tr>
<tr>
<td>advertising infants</td>
<td>η² = .03;</td>
<td></td>
</tr>
<tr>
<td>g development affection</td>
<td>η² = .04. At 4-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>months play η²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= .02, caretaking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>η² = .01.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention vs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control –</td>
</tr>
<tr>
<td></td>
<td>attachment - η² baseline= .07.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>η²$^{4}$month = .11,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>η²$^{9}$month = .17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Those more</td>
<td></td>
</tr>
<tr>
<td></td>
<td>engaged in</td>
<td></td>
</tr>
</tbody>
</table>
The DadRocks Study

program and
those report
program useful
= more
affection, play,
caretaking at 9
months.
If used
calendar,
reported
affection and
caretaking
higher at 9
months.

| Maycock et al. | RCT/Fathers as prenatal | 1600 total | Control = Not yet done | not yet done | not yet done |
The DadRocks Study

(2013), Australia

Can a mobile app increase breastfeeding duration; Proposed program assigned to each of 3 levels of intensity M1-special class for fathers; M2 - social support (App) H1 - both class for fathers and app; studied at baseline, 6, 26 weeks

McKellar et al (2008), Australia

Action Research Study/ Questionnaire for infants: first questionnaires used postcards; 19 given educational postcards, more

Design of post-cards providing development of content entire postcard; fathers were
### The DadRocks Study

| Development and testing of enhancing postnatal education for fathers | focus groups) – concerns about being a parent. Themes found. Post cards created about themes and given to fathers. fathers then (19 first time fathers); focus groups n=9 | time for fathers postcards. In another postcards were helpful. Fathers Themes fathers second questionnaire satisfaction. postcard topics were the most helpful. information) created (22 first-time fathers) time identified “being involved in baby’s care” as being helpful, | for fathers information for fathers 13 read 1/2. Included in the provision of postnatal education. measures on use, identify which include fathers, need for father-specific information) Twenty-four (70.6 %) fathers identified identified “being involved in baby’s care” as being helpful, | 33/34 stated another postcards were postnatal education. measures on use, identify which include fathers, need for father-specific information) Twenty-four (70.6 %) fathers identified identified “being involved in baby’s care” as being helpful, |
The DadRocks Study

tested.

Most used/

liked the informatio

n.

21 (61.8 %)

identified

‘‘newborn abilities and needs,’’ 18

(52.9 %)

identified

‘‘supporting each other,’’

and 6 (17.6 %)

identified

‘‘services and support for fathers.’’
The DadRocks Study

Magill- Evans et al (2007), Parenting Education in Canada RCT/ Parenting education program the effects of video self-modeling with feedback delivered during two home visits. Fathers with infants under 5 months old, 81 in intervention, 81 in control, randomly assigned. Fathers interact with infant while being video taped. Review tapes with nurse, providing positive feedback. Nursing Assessment Teaching Scale; Parenting Sense of Competence; Demographics; open ended interview. Fathers in intervention were more skilled at promoting cognitive growth and development, more sensitive to infant cues at 8 months old. Program increased interaction, fathers interaction, children's age, Sig between group and time for Parent Total Score —
The DadRocks Study

intervention increased, control decreased
\( \eta^2 = .07 \); Control group – less sensitive to infant cues vs. intervention more skilled in fostering cognitive growth (\( \eta^2 = .06 \)). Main effect for time for efficacy
The DadRocks Study

Benzies et al (2008), To test parenting education program, which fathers benefitted. Follow up to 2007 secondary analysis of 2007 data, of demographic variables related to positive change in behaviour, and also fathers with infants under 5 months in intervention, 81 in control, randomly assigned interview re: programs utility; pre and post-test interaction scores; regression to determine demographic predictors of improvement. Test at baseline (5 Nursing child Assessment Teaching Scale; Parenting interactions

Fathers found program useful, interaction, and could be used in public health setting. Only a few sig. Fathers with pos change parent girls rather than boys, Trend $\chi^2$
The DadRocks Study

satisfaction months),  = (1, N=34)

n outcome (8 months)

52.75, p = .10

Fathers with positive change started with less skill in interaction (vs. those with marked negative change) t(32) = 4.34, p<.001

<table>
<thead>
<tr>
<th>Darrell</th>
<th>RCT/ Quasi</th>
<th>fathers with</th>
<th>12 father-infant dyads in</th>
<th>Parenting Stress Index</th>
<th>Massage</th>
<th>Massage instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheng et Can</td>
<td>infants 5-14 months old</td>
<td>Pilot, mixed methods.</td>
<td>Tested at</td>
<td>decreased paternal stress, fathers liked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>attachment</td>
<td></td>
<td></td>
<td></td>
<td>decreased stress, fathers liked</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The DadRocks Study

al (2011), be fostered through infant massage? Will this decrease parent-related stress? Each group - wait-list control, based on infant availability for class.

4 week infant massage class. Paternal stress in scale, and interview. Life Stress - main effect

Experimental group $\eta^2=.17$; life stress $\eta^2=.00$; time x condition

4 week intervention. Parents may benefit from postnatal education.
The DadRocks Study

interaction

$\eta^2 = .13$
Table 2

*Schedule for surveys*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Baseline</th>
<th>Mid-study (3-months)</th>
<th>Post-study (6-month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-study demographics</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-study demographics</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Post-study demographics</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Father-infant interaction questionnaire</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Parent-infant activities scale</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Postnatal attachment scale</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Postnatal attachment scale</td>
<td></td>
<td>✓ (if infant born)</td>
<td></td>
</tr>
<tr>
<td>Attitudes towards FI relationship</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Relationship Quality</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Perceived behavioural control</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>State &amp; Trait Anxiety Scale</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Open ended question</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Process evaluation questions</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Feasibility questions</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
Table 3

Summary of research protocol

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Recruitment - contact locations, through social media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2</td>
<td>Welcome fathers who contact, inform of the process, obtain consent, obtain expected birthdate, remind fathers close to expected birth date.</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Once baby born, send pre-study survey</td>
</tr>
</tbody>
</table>

INTERVENTION

<table>
<thead>
<tr>
<th>Stage 4</th>
<th>Begin text message protocol, monitor responses on FB page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 5</td>
<td>When infant is 3 months, send mid-study survey</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Continue text message protocol, monitor FB page</td>
</tr>
<tr>
<td>Stage 7</td>
<td>When infant is 6 months, send post-study survey. Provide feedback on study, thank them for their time.</td>
</tr>
</tbody>
</table>
Table 4

Demographics of fathers

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean = 31.87</th>
<th>Range 27-39</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have older children?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Biological father</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Married (baseline)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>1 Engaged</td>
<td></td>
</tr>
<tr>
<td>Employed full time (baseline)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>1 student</td>
<td></td>
</tr>
</tbody>
</table>

Breastfeeding Intentions (baseline)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>12</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
</tr>
</tbody>
</table>

Education level

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-secondary degree, diploma, or certificate (including trades)</td>
<td>13</td>
</tr>
<tr>
<td>Some post-secondary education</td>
<td>2</td>
</tr>
</tbody>
</table>

What is your family's annual income?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>$20,000- $39,999</td>
<td>2</td>
</tr>
<tr>
<td>$40,000- $59,999</td>
<td>3</td>
</tr>
<tr>
<td>Income Range</td>
<td>Frequency</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>$60,000- $79,999</td>
<td>1</td>
</tr>
<tr>
<td>$80,000- $99,999</td>
<td>3</td>
</tr>
<tr>
<td>More than $100,000</td>
<td>5</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Language</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>14</td>
<td>85.70 %</td>
</tr>
<tr>
<td>English/French (wife English only)</td>
<td>1</td>
<td>7.10 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender of Infant</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>5</td>
<td>35 %</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>65 %</td>
</tr>
</tbody>
</table>
Table 5

*Where do you look for parenting Information?*

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Three-month</th>
<th>Six-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>12</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Parenting websites</td>
<td>11</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Videos</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Write in: family members</td>
<td>3</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Social Media (e.g. FB)</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Write in: midwives</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Write in: YMCA</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Write in: Niagara Region</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Write in: friends</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Write in: online</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 6

*Time of day interacting with infant*

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>three-month</th>
<th>Six-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evenings</td>
<td>67 %</td>
<td>69 %</td>
<td>75 %</td>
</tr>
<tr>
<td>Overnight</td>
<td>7 %</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Afternoons</td>
<td>7 %</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All Day</td>
<td>7 %</td>
<td>8 %</td>
<td>12 %</td>
</tr>
<tr>
<td>Unclear “yes”</td>
<td>7 %</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Afternoon, evening</td>
<td>0</td>
<td>15 %</td>
<td>12 %</td>
</tr>
<tr>
<td>Morning</td>
<td>0</td>
<td>8 %</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 7

Were you satisfied with the text messages (yes or no)

<table>
<thead>
<tr>
<th></th>
<th>three-month</th>
<th></th>
<th>six-month</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>yes</td>
<td>8</td>
<td>57 %</td>
<td>7</td>
<td>64 %</td>
</tr>
<tr>
<td>no</td>
<td>6</td>
<td>43 %</td>
<td>4</td>
<td>36 %</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100 %</td>
<td>11</td>
<td>100 %</td>
</tr>
</tbody>
</table>
Table 8

*Study Satisfaction*

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>3.69 (.91)</td>
</tr>
<tr>
<td>6 months</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>3.78 (1.02)</td>
</tr>
</tbody>
</table>

Liking Study

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>0</th>
<th>2</th>
<th>0</th>
<th>2</th>
<th>3</th>
<th>8</th>
<th>7</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.69</td>
<td></td>
<td></td>
<td></td>
<td>3.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Study interest in completing

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>1</th>
<th>3</th>
<th>3</th>
<th>8</th>
<th>6</th>
<th>1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.46</td>
<td></td>
<td></td>
<td></td>
<td>3.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 159
Table 9

*Message feedback – three- and six-month*

<table>
<thead>
<tr>
<th></th>
<th>3 months</th>
<th>6 months</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 mo.</td>
<td>3 mo.</td>
<td>3 mo.</td>
<td>3 mo.</td>
<td>3 mo.</td>
<td>3 mo.</td>
<td>3 mo.</td>
<td></td>
</tr>
<tr>
<td>Enjoyed messages</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td></td>
<td>3.08 (1.15)</td>
<td></td>
</tr>
<tr>
<td>Messages useful</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>0</td>
<td></td>
<td>3.15 (1.14)</td>
<td></td>
</tr>
<tr>
<td>Reading Messages, Doing activities</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td></td>
<td>3.62 (0.74)</td>
<td></td>
</tr>
<tr>
<td>Messages helpful</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td></td>
<td>3.15 (1)</td>
<td></td>
</tr>
<tr>
<td>understanding baby</td>
<td>6</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td></td>
<td>2.08 (1.27)</td>
<td></td>
</tr>
<tr>
<td>Referred to Content</td>
<td>9</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td></td>
<td>1.92 (0.91)</td>
<td></td>
</tr>
<tr>
<td>Used Resources</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td></td>
<td>2.92 (1.21)</td>
<td></td>
</tr>
<tr>
<td>Messages Relevant</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td></td>
<td>2.92 (1.14)</td>
<td></td>
</tr>
<tr>
<td>Used Suggestions</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td></td>
<td>2.92 (1.14)</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Count 1</td>
<td>Count 2</td>
<td>Count 3</td>
<td>Count 4</td>
<td>Count 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referred to Content</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2.11 (0.63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used Resources</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>2.22 (0.84)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Messages Relevant</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td>2.92 (1.08)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used Suggestions</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>3.56 (0.82)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 10

Message Feedback – Semantic differential item frequencies and Means

Did you feel the messages were:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Three months, n=14</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meaningful</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>Meaningless</td>
</tr>
<tr>
<td>Botherome</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>Unobtrusive</td>
</tr>
<tr>
<td>Helpful</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Not helpful</td>
</tr>
<tr>
<td>Joyful</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Stressful</td>
</tr>
<tr>
<td>Surprising</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>Predictable</td>
</tr>
<tr>
<td>Attention-Grabbing</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>Unspectacular</td>
</tr>
<tr>
<td>Interesting</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>Boring</td>
</tr>
<tr>
<td><strong>Six months, n=11</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meaningful</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>Meaningless</td>
</tr>
<tr>
<td>Botherome</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>Unobtrusive</td>
</tr>
<tr>
<td>Helpful</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>Not helpful</td>
</tr>
<tr>
<td>Joyful</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Stressful</td>
</tr>
<tr>
<td>Surprising</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>Predictable</td>
</tr>
<tr>
<td>Attention-Grabbing</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>Unspectacular</td>
</tr>
<tr>
<td>Interesting</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Boring</td>
</tr>
</tbody>
</table>
Table 11

*Paired sample tests – baseline and three-month*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Mean</th>
<th>n</th>
<th>SD</th>
<th>SEM</th>
<th>t-value</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction Total</td>
<td>Baseline</td>
<td>3.50</td>
<td>13</td>
<td>0.67</td>
<td>0.19</td>
<td>2.991</td>
<td>12</td>
<td>0.011*</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>3.93</td>
<td>13</td>
<td>0.47</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affection</td>
<td>Baseline</td>
<td>4.37</td>
<td>13</td>
<td>0.67</td>
<td>0.19</td>
<td>1.04</td>
<td>12</td>
<td>0.319</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>4.24</td>
<td>13</td>
<td>0.45</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care</td>
<td>Baseline</td>
<td>3.44</td>
<td>13</td>
<td>0.67</td>
<td>0.19</td>
<td>0.812</td>
<td>12</td>
<td>0.433</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>3.57</td>
<td>13</td>
<td>0.61</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play</td>
<td>Baseline</td>
<td>2.69</td>
<td>13</td>
<td>1.05</td>
<td>0.29</td>
<td>5.806</td>
<td>12</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>4.08</td>
<td>13</td>
<td>0.60</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attachment Total</td>
<td>Baseline</td>
<td>4.12</td>
<td>13</td>
<td>0.34</td>
<td>0.11</td>
<td>0.618</td>
<td>8</td>
<td>0.553</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>4.21</td>
<td>13</td>
<td>0.23</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence Hostility</td>
<td>Baseline</td>
<td>3.78</td>
<td>13</td>
<td>0.36</td>
<td>0.10</td>
<td>0.732</td>
<td>12</td>
<td>0.478</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>3.69</td>
<td>13</td>
<td>0.43</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Interaction</td>
<td>Baseline</td>
<td>4.44</td>
<td>13</td>
<td>0.38</td>
<td>0.11</td>
<td>0.478</td>
<td>12</td>
<td>0.641</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>4.38</td>
<td>13</td>
<td>0.33</td>
<td>0.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasure Interaction</td>
<td>Baseline</td>
<td>3.98</td>
<td>13</td>
<td>0.75</td>
<td>0.21</td>
<td>1.28</td>
<td>12</td>
<td>0.225</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>4.25</td>
<td>13</td>
<td>0.43</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>Baseline</td>
<td>3.99</td>
<td>13</td>
<td>0.30</td>
<td>0.08</td>
<td>1.554</td>
<td>12</td>
<td>0.146</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>4.11</td>
<td>13</td>
<td>0.32</td>
<td>0.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couple Quality</td>
<td>Baseline</td>
<td>9.18</td>
<td>13</td>
<td>0.55</td>
<td>0.08</td>
<td>1.923</td>
<td>12</td>
<td>0.078°</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>8.92</td>
<td>13</td>
<td>0.66</td>
<td>0.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>Baseline</td>
<td>9.18</td>
<td>13</td>
<td>0.55</td>
<td>0.15</td>
<td>0.532</td>
<td>12</td>
<td>0.604</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>8.92</td>
<td>13</td>
<td>0.66</td>
<td>0.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baseline</td>
<td>26.41</td>
<td>13</td>
<td>7.26</td>
<td>2.01</td>
<td>0.362</td>
<td>12</td>
<td>0.724</td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>24.87</td>
<td>13</td>
<td>8.57</td>
<td>2.38</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.05$. 
Table 12

*Paired sample tests – baseline and six-month*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Mean</th>
<th>n</th>
<th>SD</th>
<th>SEM</th>
<th>t-value</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction Total</td>
<td>Baseline</td>
<td>3.53</td>
<td>9</td>
<td>0.67</td>
<td>0.22</td>
<td>2.492</td>
<td>8</td>
<td>0.037*</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.03</td>
<td>9</td>
<td>0.51</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affection</td>
<td>Baseline</td>
<td>4.46</td>
<td>9</td>
<td>0.61</td>
<td>0.20</td>
<td>1.474</td>
<td>8</td>
<td>0.179</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.22</td>
<td>9</td>
<td>0.46</td>
<td>0.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care</td>
<td>Baseline</td>
<td>3.42</td>
<td>9</td>
<td>0.58</td>
<td>0.19</td>
<td>0.851</td>
<td>8</td>
<td>0.419</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>3.60</td>
<td>9</td>
<td>0.71</td>
<td>0.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play</td>
<td>Baseline</td>
<td>2.75</td>
<td>9</td>
<td>1.19</td>
<td>0.40</td>
<td>4.341</td>
<td>8</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.40</td>
<td>9</td>
<td>0.52</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attachment Total</td>
<td>Baseline</td>
<td>3.80</td>
<td>9</td>
<td>0.29</td>
<td>0.10</td>
<td>0.185</td>
<td>8</td>
<td>0.571</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>3.76</td>
<td>9</td>
<td>0.38</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence Hostility</td>
<td>Baseline</td>
<td>4.47</td>
<td>9</td>
<td>0.36</td>
<td>0.12</td>
<td>0.064</td>
<td>8</td>
<td>0.951</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.48</td>
<td>9</td>
<td>0.31</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Interaction</td>
<td>Baseline</td>
<td>3.82</td>
<td>9</td>
<td>0.82</td>
<td>0.27</td>
<td>1.158</td>
<td>8</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.18</td>
<td>9</td>
<td>0.29</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasure Interaction</td>
<td>Baseline</td>
<td>4.12</td>
<td>9</td>
<td>0.34</td>
<td>0.11</td>
<td>0.618</td>
<td>8</td>
<td>0.553</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.21</td>
<td>9</td>
<td>0.23</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>Baseline</td>
<td>4.01</td>
<td>9</td>
<td>0.24</td>
<td>0.08</td>
<td>0.555</td>
<td>8</td>
<td>0.594</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.07</td>
<td>9</td>
<td>0.31</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couple Quality</td>
<td>Baseline</td>
<td>9.24</td>
<td>9</td>
<td>0.43</td>
<td>0.14</td>
<td>2.848</td>
<td>8</td>
<td>0.022*</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>8.80</td>
<td>9</td>
<td>0.61</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAI</td>
<td>Baseline</td>
<td>26.30</td>
<td>9</td>
<td>8.73</td>
<td>2.91</td>
<td>0.174</td>
<td>8</td>
<td>0.866</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>25.56</td>
<td>9</td>
<td>9.43</td>
<td>3.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBC</td>
<td>Baseline</td>
<td>7.11</td>
<td>9</td>
<td>2.42</td>
<td>0.81</td>
<td>0.679</td>
<td>8</td>
<td>0.516</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>6.56</td>
<td>9</td>
<td>2.24</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05 level
### Table 13

**Paired sample tests – three-month and six-month**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Mean</th>
<th>n</th>
<th>SD</th>
<th>SEM</th>
<th>t-value</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction Total</td>
<td>three-month</td>
<td>3.85</td>
<td>9</td>
<td>0.40</td>
<td>0.13</td>
<td>1.737</td>
<td>8</td>
<td>0.121</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.03</td>
<td>9</td>
<td>0.51</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affection</td>
<td>three-month</td>
<td>4.19</td>
<td>9</td>
<td>0.34</td>
<td>0.11</td>
<td>0.244</td>
<td>8</td>
<td>0.813</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.22</td>
<td>9</td>
<td>0.46</td>
<td>0.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care</td>
<td>three-month</td>
<td>3.40</td>
<td>9</td>
<td>0.53</td>
<td>0.18</td>
<td>2.204</td>
<td>8</td>
<td>0.059°</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>3.60</td>
<td>9</td>
<td>0.71</td>
<td>0.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play</td>
<td>three-month</td>
<td>4.08</td>
<td>9</td>
<td>0.62</td>
<td>0.21</td>
<td>1.474</td>
<td>8</td>
<td>0.179</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.40</td>
<td>9</td>
<td>0.52</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attachment Total</td>
<td>three-month</td>
<td>3.67</td>
<td>9</td>
<td>0.51</td>
<td>0.17</td>
<td>1.436</td>
<td>8</td>
<td>0.189</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>3.76</td>
<td>9</td>
<td>0.38</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence Hostility</td>
<td>three-month</td>
<td>4.33</td>
<td>9</td>
<td>0.34</td>
<td>0.11</td>
<td>-0.557</td>
<td>8</td>
<td>0.592</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.48</td>
<td>9</td>
<td>0.31</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Interaction</td>
<td>three-month</td>
<td>4.13</td>
<td>9</td>
<td>0.30</td>
<td>0.10</td>
<td>1.260</td>
<td>8</td>
<td>0.243</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.18</td>
<td>9</td>
<td>0.29</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasure Interaction</td>
<td>three-month</td>
<td>4.10</td>
<td>9</td>
<td>0.32</td>
<td>0.11</td>
<td>0.512</td>
<td>8</td>
<td>0.622</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.21</td>
<td>9</td>
<td>0.23</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>three-month</td>
<td>4.17</td>
<td>9</td>
<td>0.29</td>
<td>0.10</td>
<td>1.403</td>
<td>8</td>
<td>0.198</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>4.07</td>
<td>9</td>
<td>0.31</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couple Quality</td>
<td>three-month</td>
<td>8.82</td>
<td>9</td>
<td>0.62</td>
<td>0.21</td>
<td>0.115</td>
<td>8</td>
<td>0.911</td>
</tr>
<tr>
<td></td>
<td>six-month</td>
<td>8.80</td>
<td>9</td>
<td>0.61</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>three-month</td>
<td>six-month</td>
<td>six-month</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td>-----------</td>
<td>-----------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAI</td>
<td>25.93</td>
<td>25.56</td>
<td>25.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>9.43</td>
<td>9.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.24</td>
<td>9.43</td>
<td>9.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.41</td>
<td>3.14</td>
<td>3.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.079</td>
<td>0.758</td>
<td>0.758</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.939</td>
<td>0.470</td>
<td>0.470</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.05$ level
Table 14

*Correlations: Analysis of study variables at three-months*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>FI</td>
<td>Inter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>-Care</td>
<td>.89**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>-Play</td>
<td>.86**</td>
<td>.57*</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>-Affection</td>
<td>.88**</td>
<td>.66**</td>
<td>.79**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Attachment</td>
<td>.46</td>
<td>.54*</td>
<td>.14</td>
<td>.48</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>-Absence of Hostility</td>
<td>-.07</td>
<td>.05</td>
<td>-.29</td>
<td>.03</td>
<td>.59*</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>-Quality in Interaction</td>
<td>.38</td>
<td>.50</td>
<td>.07</td>
<td>.37</td>
<td>.93**</td>
<td>.40</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>-Pleasure in Inter</td>
<td>.72**</td>
<td>.67**</td>
<td>.52*</td>
<td>.71**</td>
<td>.78**</td>
<td>.06</td>
<td>.70**</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>FI Attitude</td>
<td>.57*</td>
<td>.43</td>
<td>.55*</td>
<td>.57*</td>
<td>.15</td>
<td>.16</td>
<td>.06</td>
<td>.14</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Couple Satisfaction</td>
<td>.29</td>
<td>.41</td>
<td>.06</td>
<td>.22</td>
<td>.57*</td>
<td>.22</td>
<td>.66**</td>
<td>.39</td>
<td>.05</td>
<td>---</td>
</tr>
<tr>
<td>11.</td>
<td>Anxiety</td>
<td>-.15</td>
<td>-.19</td>
<td>-.11</td>
<td>-.08</td>
<td>-.31</td>
<td>-.26</td>
<td>-.16</td>
<td>-.32</td>
<td>.02</td>
<td>-.17</td>
</tr>
<tr>
<td>12.</td>
<td>PBC</td>
<td>-.38</td>
<td>-.46</td>
<td>-.16</td>
<td>-.32</td>
<td>-.40</td>
<td>-.02</td>
<td>-.48</td>
<td>-.38</td>
<td>-.32</td>
<td>-.09</td>
</tr>
</tbody>
</table>

* p < 0.05. ** p < 0.01.
Table 15

*Correlations between Measures and Satisfaction with Messages at three months*

<table>
<thead>
<tr>
<th>Message</th>
<th>Inter-Care</th>
<th>Play</th>
<th>Aff</th>
<th>Attach all</th>
<th>Abs-host</th>
<th>-qual interact</th>
<th>Pleas inter</th>
<th>Attitude Satis</th>
<th>Coup STAI</th>
<th>PBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Satisfaction Scale</td>
<td>-0.46</td>
<td>-0.36</td>
<td>-0.32</td>
<td>-0.60*</td>
<td>-0.34</td>
<td>-0.27</td>
<td>-0.29</td>
<td>-0.23</td>
<td>-0.63*</td>
<td>-0.23</td>
</tr>
<tr>
<td>Reading Messages, Doing activities</td>
<td>0.40</td>
<td>0.22</td>
<td>0.34</td>
<td>.61*</td>
<td>0.42</td>
<td>0.24</td>
<td>0.36</td>
<td>0.35</td>
<td>.61*</td>
<td>0.22</td>
</tr>
<tr>
<td>Enjoyed messages</td>
<td>-0.02</td>
<td>-0.10</td>
<td>0.05</td>
<td>0.04</td>
<td>-0.08</td>
<td>-0.11</td>
<td>-0.25</td>
<td>0.30</td>
<td>-0.10</td>
<td>0.21</td>
</tr>
<tr>
<td>Messages useful</td>
<td>-0.11</td>
<td>-0.16</td>
<td>-0.04</td>
<td>-0.07</td>
<td>-0.14</td>
<td>-0.19</td>
<td>-0.32</td>
<td>0.18</td>
<td>-0.22</td>
<td>0.20</td>
</tr>
<tr>
<td>Messages helpful</td>
<td>0.03</td>
<td>0.07</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.08</td>
<td>-0.22</td>
<td>-0.29</td>
<td>0.31</td>
<td>-0.07</td>
<td>0.08</td>
</tr>
<tr>
<td>Messages helpful</td>
<td>0.03</td>
<td>0.07</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.08</td>
<td>-0.22</td>
<td>-0.29</td>
<td>0.31</td>
<td>-0.07</td>
<td>0.08</td>
</tr>
<tr>
<td>Message Referred to Content</td>
<td>0.04</td>
<td>-0.06</td>
<td>0.19</td>
<td>0.01</td>
<td>-0.18</td>
<td>-0.08</td>
<td>-0.09</td>
<td>-0.23</td>
<td>0.11</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Used Resources</td>
<td>Messages</td>
<td>Relevant Used</td>
<td>Suggestions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------</td>
<td>----------</td>
<td>---------------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.01</td>
<td>-0.02</td>
<td>0.04</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.30</td>
<td>-0.48</td>
<td>-0.15</td>
<td>-0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.15</td>
<td>-0.10</td>
<td>-0.05</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.64*</td>
<td>-0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>-0.13</td>
<td>0.09</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.04</td>
<td>0.26</td>
<td>-0.09</td>
<td>-0.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.34</td>
<td>-0.13</td>
<td>0.19</td>
<td>-.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.01</td>
<td>-0.09</td>
<td>0.06</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.12</td>
<td>0.15</td>
<td>-0.13</td>
<td>-0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.26</td>
<td>-0.15</td>
<td>0.18</td>
<td>-.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am liking the study</td>
<td>0.29</td>
<td>0.14</td>
<td>0.24</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.44</td>
<td>0.49</td>
<td>0.35</td>
<td>0.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.52</td>
<td>0.18</td>
<td>-0.08</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study Interesting</td>
<td>0.22</td>
<td>0.08</td>
<td>0.16</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.36</td>
<td>0.48</td>
<td>0.28</td>
<td>0.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.56*</td>
<td>0.12</td>
<td>0.15</td>
<td>-.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05. ** p < .01.
Table 16

First time fathers - Correlations between variables at three months

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FI Interaction</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Interaction - Care</td>
<td>.80*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Interaction - Play</td>
<td>.87**</td>
<td>0.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Interaction - Affection</td>
<td>.92**</td>
<td>0.58</td>
<td>.82*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Attachment Overall</td>
<td>0.63</td>
<td>.73*</td>
<td>0.27</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Absence Hostility</td>
<td>0.32</td>
<td>0.38</td>
<td>0.09</td>
<td>0.38</td>
<td>0.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Quality Inter</td>
<td>0.34</td>
<td>0.55</td>
<td>0.00</td>
<td>0.30</td>
<td>.81*</td>
<td>-0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Pleasure Inter</td>
<td>0.70</td>
<td>0.65</td>
<td>0.48</td>
<td>0.68</td>
<td>.91**</td>
<td>0.13</td>
<td>.78*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Attitude</td>
<td>0.44</td>
<td>0.31</td>
<td>0.36</td>
<td>0.48</td>
<td>-0.01</td>
<td>0.48</td>
<td>-0.26</td>
<td>-0.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. CoupleSatis</td>
<td>0.08</td>
<td>0.54</td>
<td>-0.35</td>
<td>-0.04</td>
<td>0.69</td>
<td>0.31</td>
<td>.73*</td>
<td>0.46</td>
<td>-0.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. STAI</td>
<td>-0.27</td>
<td>-0.37</td>
<td>-0.04</td>
<td>-0.27</td>
<td>-0.62</td>
<td>-0.35</td>
<td>-0.34</td>
<td>-0.65</td>
<td>0.20</td>
<td>-0.36</td>
<td></td>
</tr>
<tr>
<td>12. PBC</td>
<td>-0.02</td>
<td>-0.18</td>
<td>0.14</td>
<td>0.02</td>
<td>-0.28</td>
<td>0.11</td>
<td>-0.56</td>
<td>-0.12</td>
<td>-0.13</td>
<td>-0.39</td>
<td>-0.38</td>
</tr>
</tbody>
</table>

* p < 0.05. ** p < 0.01.
Table 17

*First time Fathers* - *Correlations between Measures and Satisfaction*

<table>
<thead>
<tr>
<th></th>
<th>Interact</th>
<th>-Care</th>
<th>-Play</th>
<th>-Aff</th>
<th>Attach Overall</th>
<th>-qual absence host</th>
<th>-pleas Inter</th>
<th>Attitude</th>
<th>Couple Satis</th>
<th>STAI</th>
<th>PBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Satisfaction Scale</td>
<td>-0.23</td>
<td>0.10</td>
<td>-0.27</td>
<td>-0.49</td>
<td>-0.09</td>
<td>-0.44</td>
<td>0.12</td>
<td>0.08</td>
<td>-0.66*</td>
<td>0.25</td>
<td>-0.35</td>
</tr>
<tr>
<td>Reading Messages,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doi ng activities</td>
<td>0.14</td>
<td>-0.18</td>
<td>0.17</td>
<td>0.46</td>
<td>0.23</td>
<td>0.41</td>
<td>0.04</td>
<td>0.09</td>
<td>0.46</td>
<td>-0.16</td>
<td>0.10</td>
</tr>
<tr>
<td>Enjoyed messages</td>
<td>-0.35</td>
<td>-0.59</td>
<td>-0.14</td>
<td>-0.10</td>
<td>-0.49</td>
<td>0.17</td>
<td>-0.60</td>
<td>-0.57</td>
<td>0.08</td>
<td>-0.37</td>
<td>0.46</td>
</tr>
<tr>
<td>Messages useful</td>
<td>-0.35</td>
<td>-0.59</td>
<td>-0.14</td>
<td>-0.10</td>
<td>-0.49</td>
<td>0.17</td>
<td>-0.60</td>
<td>-0.57</td>
<td>0.08</td>
<td>-0.37</td>
<td>0.46</td>
</tr>
<tr>
<td>Messages helpful</td>
<td>-0.17</td>
<td>-0.28</td>
<td>-0.13</td>
<td>0.01</td>
<td>-0.30</td>
<td>0.52</td>
<td>-0.57</td>
<td>-0.49</td>
<td>0.29</td>
<td>-0.17</td>
<td>0.27</td>
</tr>
<tr>
<td>understanding baby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referred to Content</td>
<td>-0.03</td>
<td>-0.27</td>
<td>0.16</td>
<td>0.08</td>
<td>-0.22</td>
<td>-0.23</td>
<td>-0.09</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.14</td>
<td>0.65*</td>
</tr>
<tr>
<td>Used Resources</td>
<td>0.28</td>
<td>-0.03</td>
<td>0.22</td>
<td>0.60</td>
<td>0.24</td>
<td>0.43</td>
<td>0.02</td>
<td>0.11</td>
<td>0.49</td>
<td>-0.13</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Messages Relevant</td>
<td>-0.17</td>
<td>-0.47</td>
<td>-0.02</td>
<td>0.11</td>
<td>-0.31</td>
<td>0.22</td>
<td>-0.43</td>
<td>-0.40</td>
<td>0.19</td>
<td>-0.32</td>
<td>0.45</td>
</tr>
<tr>
<td>Used Suggestions</td>
<td>-0.32</td>
<td>-0.65*</td>
<td>-0.09</td>
<td>-0.02</td>
<td>-0.44</td>
<td>0.07</td>
<td>-0.50</td>
<td>-0.47</td>
<td>0.07</td>
<td>-0.44</td>
<td>0.45</td>
</tr>
<tr>
<td>I am liking the study</td>
<td>-0.31</td>
<td>-0.35</td>
<td>-0.23</td>
<td>-0.19</td>
<td>-0.28</td>
<td>-0.28</td>
<td>0.01</td>
<td>-0.34</td>
<td>-0.19</td>
<td>0.04</td>
<td>.72*</td>
</tr>
<tr>
<td>Study Interesting</td>
<td>0.42</td>
<td>0.23</td>
<td>0.29</td>
<td>0.62</td>
<td>0.36</td>
<td>0.46</td>
<td>0.20</td>
<td>0.15</td>
<td>0.65*</td>
<td>0.06</td>
<td>0.28</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05. ** p < .01.
Table 18

*Fathers with older children - Correlations between variables at three months*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interaction Mean</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Interaction - Care Mean</td>
<td>0.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Interaction - Play Mean</td>
<td>0.84</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Intera - Affection Mean</td>
<td>0.78</td>
<td>0.49</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Attachment Overall</td>
<td>0.51</td>
<td>0.62</td>
<td>0.08</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Absence Hostility</td>
<td>0.12</td>
<td>0.44</td>
<td>-0.41</td>
<td>0.13</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Quality Inter</td>
<td>0.57</td>
<td>0.64</td>
<td>0.18</td>
<td>0.66</td>
<td>.99**</td>
<td>0.78</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>-----------------</td>
<td>---------------------</td>
<td>----------</td>
<td>--------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.73 0.58 0.53 0.89* 0.85 0.43 0.47 0.90*</td>
<td>0.81 0.56 0.79 0.87 0.34 0.01 0.99 0.39 0.6</td>
<td>0.89 0.69 0.8 0.84 0.59 0.1 0.88 0.68 0.89* 0.64</td>
<td>-0.87 -0.92* -0.64 -0.4 -0.27 -0.11 0.87 -0.31 -0.33 -0.62 -0.58</td>
<td>-0.27 -0.33 0.07 -0.55 -0.81 -0.79 0.11 -0.77 -0.61 -0.47 -0.23 0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05, ** p < 0.01.
**Table 19**

*Fathers with older children - Correlations between Measures and Satisfaction*

<table>
<thead>
<tr>
<th>Measures</th>
<th>Interaction</th>
<th>Care</th>
<th>Play</th>
<th>Aff</th>
<th>Overall</th>
<th>Presence</th>
<th>Interest</th>
<th>Satisfaction</th>
<th>Attitude</th>
<th>Cuple</th>
<th>STAI</th>
<th>PBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Satisfaction Scale</td>
<td>-0.73</td>
<td>-0.67</td>
<td>-0.49</td>
<td>-0.73</td>
<td>-0.55</td>
<td>-0.40</td>
<td>-0.56</td>
<td>-0.90</td>
<td>-0.48</td>
<td>0.65</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Reading Messages, Doing activities</td>
<td>0.59</td>
<td>0.35</td>
<td>0.52</td>
<td>0.88*</td>
<td>0.52</td>
<td>0.25</td>
<td>0.54</td>
<td>0.68</td>
<td>.90*</td>
<td>0.51</td>
<td>-0.28</td>
<td>-0.76</td>
</tr>
<tr>
<td>Enjoyed messages</td>
<td>0.73</td>
<td>0.67</td>
<td>0.49</td>
<td>0.73</td>
<td>0.55</td>
<td>0.40</td>
<td>0.55</td>
<td>0.56</td>
<td>.90*</td>
<td>0.48</td>
<td>-0.65</td>
<td>-0.72</td>
</tr>
<tr>
<td>Messages useful</td>
<td>0.66</td>
<td>0.84</td>
<td>0.22</td>
<td>0.44</td>
<td>0.66</td>
<td>0.66</td>
<td>0.63</td>
<td>0.45</td>
<td>0.61</td>
<td>0.37</td>
<td>-0.74</td>
<td>-0.68</td>
</tr>
<tr>
<td>Messages helpful understanding baby</td>
<td>0.55</td>
<td>0.80</td>
<td>0.17</td>
<td>0.08</td>
<td>0.29</td>
<td>0.41</td>
<td>0.26</td>
<td>0.07</td>
<td>0.40</td>
<td>0.16</td>
<td>-0.85</td>
<td>-0.26</td>
</tr>
<tr>
<td>Referred to Content</td>
<td>0.64</td>
<td>0.58</td>
<td>0.57</td>
<td>0.36</td>
<td>-0.04</td>
<td>-0.10</td>
<td>-0.02</td>
<td>0.05</td>
<td>0.76</td>
<td>0.23</td>
<td>-0.80</td>
<td>-0.14</td>
</tr>
<tr>
<td>Used Resources</td>
<td>-0.03</td>
<td>-0.31</td>
<td>0.44</td>
<td>-0.10</td>
<td>-0.85</td>
<td>-0.93</td>
<td>-0.80</td>
<td>-0.49</td>
<td>0.19</td>
<td>-0.17</td>
<td>-0.08</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>0.73</td>
<td>0.67</td>
<td>0.49</td>
<td>0.73</td>
<td>0.55</td>
<td>0.40</td>
<td>0.55</td>
<td>0.56</td>
<td>.90⁺</td>
<td>0.48</td>
<td>-0.65</td>
<td>-0.72</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Messages Relevant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Used Suggestions</strong></td>
<td>0.71</td>
<td>0.78</td>
<td>0.43</td>
<td>0.43</td>
<td>0.34</td>
<td>0.31</td>
<td>0.33</td>
<td>0.28</td>
<td>0.75</td>
<td>0.33</td>
<td>-0.84</td>
<td>-0.45</td>
</tr>
<tr>
<td><strong>I am liking the study</strong></td>
<td>0.81</td>
<td>0.79</td>
<td>0.48</td>
<td>0.83</td>
<td>.90⁺</td>
<td>0.60</td>
<td>.92⁺</td>
<td>.92⁺</td>
<td>0.70</td>
<td>0.81</td>
<td>-0.56</td>
<td>-0.73</td>
</tr>
<tr>
<td><strong>Study Interesting Overall</strong></td>
<td>0.48</td>
<td>0.45</td>
<td>0.18</td>
<td>0.75</td>
<td>0.88</td>
<td>0.70</td>
<td>0.87</td>
<td>0.80</td>
<td>0.61</td>
<td>0.50</td>
<td>-0.19</td>
<td>-0.96⁺</td>
</tr>
</tbody>
</table>

*⁺ p < 0.05. **⁺⁺ p <.01.
Figure 1. Theory of Planned Behaviour and How It Relates to the Dadrocks Study

Are you an EXPECTING or new father? Please take part in our research study.

Involved fathers have children who:

- have more positive peer relations
- show greater language milestones
- score better on measures of school achievement
- show higher problem solving skills
- have better emotional regulation
- show increased literacy skills
- and many other advantages

**Your job:** answer short online survey, receive messages for 6 months, answer surveys at 3 and 6 months.

**Help us learn how to strengthen father involvement**

If you are interested in taking part:
visit our open FB page @DadRocksNiagara or DadRocksStudy@gmail.com

This study has received ethics clearance through the Brock University Research Ethics Board (REB 17-165 REMPFL).
Contact Dr. Lynn Rempel lrempel@brocku.ca
Figure 3. Recruitment wallet card

**ARE YOU A NEW OR EXPECTING FATHER?**
**TAKE PART IN OUR RESEARCH STUDY**

Children of involved fathers: show greater intelligence, physical, and social benefits

Answer short online surveys (now, 3, and 6 months)
Help us learn how to strengthen father involvement with infants

Facebook: @NiagaraDadsRock
Email: DadRocksStudy@gmail.com
Figure 4. Recruitment Facebook ad

You're awesome, Dad.

Help us learn how to strengthen father involvement!

Find us on Facebook @dadrocksNiagara or email us at DadRocksStudy@gmail.com
Figure 5. Infographic of Study Summary for Participants

#DadRocks Study
A study designed to test the minimal amount of instruction fathers need to improve the quality of interaction with their infant. Designed using online surveys, and text messages to reduce time load on researchers and new fathers recruited as participants.

Baseline Survey
0 months
Research about their attitudes, interaction, attachment, couple relationship quality, perceived behavioral control, and anxiety.

0-3 months
The Messages
Research based text messages of things fathers can do for their infant, and partner. Also includes developmental milestones to track.

Follow up survey
3 months
Some questions as at baseline, but also questions about messages and study satisfaction.

3-6 months
More messages
The remainder of the 99 messages.

Final Survey
6 months
Final survey completed online.

Results

Study design
Fathers liked the study. Those that liked it had better attitudes towards parenting.

Anxiety
Fathers who had higher anxiety used the suggested resources.

Changes in father involvement
These were hard to detect, as there were not enough fathers for a control group. These results must be interpreted knowing it was a limited sample.

Of the 15 fathers in the study, they played more with their infants by the 3-month time.

There was a trend towards a decrease in couple relationship satisfaction between 0-3 months.

Messages
If fathers found the messages useful, they had higher scores on interaction, affection and attitude.

If they read and used the messages, they had higher affection, attitude, and perceived behavioral control.

Some fathers did not like the messages. They found them too obvious, or not specific enough.

Quotes from fathers
"I appreciate the messages - my wife and I always look forward to getting them, though we find them comically obvious, as we have three children. However, it gives us an opportunity to discuss family and our relationship."

"Taylor messages to the level of the father (I could use less basic messages, more ideas of games to play with my daughter)"

"I'm really enjoying the study. I'm glad it keeps going for another three months. Thank you!"

facebook.com/DadRocksNiagara/
Appendix A: Stock messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Category</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1month0 Welcome to the Niagara DadRocks study! Thank you for agreeing to be in our study, we are glad to be a part of this special time!</td>
<td>info</td>
<td>sign up day if sign up after baby is born.</td>
</tr>
<tr>
<td>1month 1 Congratulations on the birth of your baby! The transition to parenting can be a stressful time – lack of sleep, a big new responsibility who requires a lot of decisions. Be sure to discuss with your partner the needs and expectations you both have.</td>
<td>General</td>
<td>General</td>
</tr>
<tr>
<td>1month 2 The first few weeks of caring for your baby takes learning and adapting from you, mom and the baby! It is normal to feel awkward. As your baby grows, so does their ability to respond to you!</td>
<td>Info</td>
<td>(McKellar et al., 2008).</td>
</tr>
<tr>
<td>1month 3 You are the expert on your baby – learn methods that work best for you and your family!</td>
<td>Info</td>
<td>(L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>1month 4 The internet can be a scary place to search for information. We like the website <a href="http://dadsingear.ok.ubc.ca/">http://dadsingear.ok.ubc.ca/</a> as researchers designed it just for</td>
<td>Info + Region</td>
<td><a href="http://dadsingear.ok.ubc.ca">http://dadsingear.ok.ubc.ca</a></td>
</tr>
</tbody>
</table>
new fathers. You can also call Niagara Region Public Health Parent Talk Line at 888-505-6074 x7555 Monday-Friday 8:30-4:30pm

1 month 5 Some great ways to bond with your baby include -kissing, cuddling, holding the infant facing you, with prolonged gaze and providing infant care such as diaper changes or bathing.  
 info (Scism & Cobb, 2017)

1 month 6 In the very early weeks and months, one of your baby’s first tasks is developing strong emotional attachment with you and your partner. Developing strong attachment helps your baby to begin to learn the skills that will later help them to manage emotional ups and downs and develop relationships with other children and adults.  
 info Direct quote from (Fletcher, 2009) fact sheet

1 month 7 The transition to parenting can be hard on both mom and dad. Be sure to discuss with your partner and your family, how you want your child raised.  
 info (Anderson et al., 2013)

1 month 8 There are lots of ways you can help your baby explore and learn. Copy what your baby is doing. Entertaining your baby with toys, or safe household objects, allows them to learn.  
 info Principles (L.A. Rempel et al., 2017)
Infants communicate in many ways, including crying. The website [http://raisingchildren.net.au/](http://raisingchildren.net.au/) has videos to help you learn how your infant is trying to communicate with you!

Do you have a photo of you and your baby? Set it as the screen saver on your phone!

Your baby is constantly changing and learning at this stage – take time to be patient to watch for her reactions.

As a father, even if your wife is feeding, there are many ways that you can help, for example, make sure your wife’s needs are met – bring her a tea, a snack, a book – whatever she needs.

I need to be patient to see my baby’s reaction when I am with her.

My baby can see me when my face is close. They can only see a few feet but love looking at you and learning your face and your emotions. The first time my baby looked at my eyes was _______. (click on link to answer poll on our FB page)
Does your baby smile at you? Soon they will start to smile and make sounds, letting you know that they are content!

Babies are learning through all their senses - they can use their hands to touch your face and learn how it is different from your partners!

Early on, infants will try to imitate facial expressions. Try copying their expressions and see if they try to copy yours! This may take patience, but it is very cute to see!

You can talk to your baby about how they look and who in the family they resemble.

All your babies’ muscles are developing now! They may like to use their legs to push on your stomach. Your baby will try to lift their head when you are holding her and supporting her head.

The first time I changed my baby’s diaper was ______ (click on link to answer poll on our FB page)
### 1 month

Play will tell your baby that you like to be with them. If you are having a play session with your infant, you can know when your baby is tired of interacting because they stop looking at you.

### Second

<table>
<thead>
<tr>
<th>Second1</th>
<th>Your baby’s cries are the way she communicates with you about everything. You may learn that they have different cries for their different needs – wet diaper, hungry, lonely, etc.!</th>
<th>General Info</th>
<th>(L.A. Rempel et al., 2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second2</td>
<td>Your baby learns to look forward to the time they get to spend with you!</td>
<td>Info</td>
<td>(McKellar et al., 2008).</td>
</tr>
<tr>
<td>Second3</td>
<td>Did you know... infant crying peaks in the second month. It then recedes by the forth or fifth month. Hang in there, it does get better! As always if you have a concern, you can call the Parent Talk line at 1-888-505-6074 ext. 7555</td>
<td>General Info</td>
<td>(Barr, 2012)</td>
</tr>
<tr>
<td>Second4</td>
<td>Being involved in the day to day tasks of caring for your baby can give you confidence!</td>
<td>Info</td>
<td>(McKellar et al., 2008).</td>
</tr>
</tbody>
</table>
Does it seem like you are constantly changing diapers? It can be good for you! Fathers who provide physical care to their infants report more satisfaction and connectedness with their infants! (Scism & Cobb, 2017)

Fathers have an important role in the emotional development of their children. You can help by getting your baby ready for feeding, burping and settling to sleep. (McKellar et al., 2008).

My baby’s favorite toy is _______. (L.A. Rempel et al., 2017)

Reading with your baby, right from the start of life, is a great way for you to help your baby to go on to develop strong literacy skills later in life. Storytelling and singing to your baby will have a positive impact on your child’s academic achievement in later years. Direct from (Fletcher, 2009) fact sheet

All babies love to be held and cuddled, it feels warm and safe. You cannot spoil a baby with hugs! (McKellar et al., 2008).

Fathers can help with feeding. Communicate with mom. Watch for ways and ask about how you can help mom feed successfully. Rempel, 2016)
You may be finding that techniques that worked to calm your baby when they were younger no longer work. This is part of them developing and maturing. Some soothing techniques other fathers have used include: cuddling; carrying; rock in cradle; swinging; swaddling; baby sling; music; car rides.

Many fathers report the first few months to be stressful, as they try to find a balance between family time, work and other activities. Discuss with your wife ways to reduce these stresses for both of you.

My baby likes to talk to me.

I showed my baby her home and talked her about where she will grow up.

The first time my baby rolled over while I was with her was ______.

My baby likes to be in the water when I give her a bath.

My baby lets me know what she wants.

My baby likes to look at moving objects.
The first “word” my baby said to me was ______.  

Second19  

Did you know: Fathers play a special role in the development of exploration and active play. While your infant is still young, you can encourage learning by taking them for walks in your neighborhood! 

Second20  

The first time my baby laughed with me was ______.  

third1  

Did you know: Fathers play a special role in teaching and providing their children with language and cognitive stimulation. Have "conversations" with your infant -by talking to them and waiting for them to respond! 

third2  

My baby puts everything to her mouth.  

third3  

I like to comfort my baby.  

third4  

My baby is happy when she sees me and sometimes cries when I leave her.  

third5  

My baby likes to hold my hand.  

third6
I imitate my baby’s sounds.  

The first time my baby held a toy was _______.  

? My baby’s favorite color is_____.

When you read with your baby from an early age, your child is more likely develop better literacy skills and be ready for school. Even if you are not much of a reader yourself, getting involved in storytelling and singing to your baby can have a positive influence.

From day to day, your infant is learning about the world and you are a big part of that world!

Being a sensitive and supportive dad is associated with fewer behaviour problems and higher social skills in their child.
The time you spend with your baby doing the basic tasks, such as changing diapers or bathing the baby is very important. Smiling, talking and gentle touch all help your baby feel safe and loved. (McKellar et al., 2008).

Keeping his family safe and healthy will always be an important part of a father’s job. (L.A. Rempel et al., 2017)

Play during bath time. (L.A. Rempel et al., 2017)

Have fun with a special repeated baby game. Play physical games that get more active as the baby grows. (L.A. Rempel et al., 2017)

Caring for your baby when they are sick helps to create a bond between you and your infant. (L.A. Rempel et al., 2017)

Show your baby a new action. It is OK if he can’t do it correctly. Trying again is how he learns to solve problems. (L.A. Rempel et al., 2017)

When your baby is doing something dangerous, redirect your baby away and give him something else to pay attention to. (L.A. Rempel et al., 2017)
Playing with new toys is a great way to bond with your baby? Young babies love squeak toys, blocks, rattles and much more! How can you introduce new toys to your baby?

Babies love to listen to you sing. What is your favourite song to sing to your child? (click on link to answer poll on our FB page)

You can teach your baby lots of new things! When your baby is ready to learn, they may: 1. Look at your face, 2. Reach out to you, 3. Turn towards you Smile, 4. Babble, 5. Coo and 6. Stop moving. When they need a break or change in activity, they will 1. Turn head or eyes away, 2. Cry/fuss, 3. Squirm/kick Pull away, 4. Yawn or frown 5. Arch back, 6. Pushing away or 7. Put hands to mouth or behind ear

I discuss with my wife how to raise our baby.

The first time my baby sat with my support was ______.

My baby makes many word sounds.
Fourth6  My baby’s favorite “word” is _______.  response  (L.A. Rempel et al., 2017)  

Fourth7  My baby is interested in other people and wants to participate in conversation.  General Info  (L.A. Rempel et al., 2017)  

Fourth8  My baby’s favorite song is _________.  response  (L.A. Rempel et al., 2017)  

Fourth9  My baby’s favorite toy is _____.  response  (L.A. Rempel et al., 2017)  

Fourth10 I describe to my baby about what is happening around her.  General Info  (L.A. Rempel et al., 2017)  

Fourth11 I play with my baby when she wants me to.  General Info  (L.A. Rempel et al., 2017)  

Fourth12 You may find that your relationship develops differently than your spouses does, but your baby may have a special reaction for you already. Does your baby react when you come home or pick them up? (click on link to go to our FB poll)  Response  (Anderson et al., 2013)  

Fourth13 The Ontario Early Years Centres host infant massage classes. This is a great way to bond with your baby!  info  (Fagan & Palm, 2015)
http://www.ymcaofniagara.org/programs/community-initiatives/ontario-early-years-centres/

<table>
<thead>
<tr>
<th>Fifth1</th>
<th>My baby chews on everything.</th>
<th>General Info (L.A. Rempel et al., 2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fifth2</td>
<td>I read books to my baby.</td>
<td>General Info (L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>Fifth3</td>
<td>My baby knows her name.</td>
<td>General Info (L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>Fifth4</td>
<td>I imitate my baby’s actions.</td>
<td>General Info (L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>Fifth5</td>
<td>My baby can point to what she wants.</td>
<td>General Info (L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>Fifth6</td>
<td>I saw my baby’s first tooth on ______.</td>
<td>response requested (L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>Fifth7</td>
<td>The first time my baby waved her hands to say goodbye when I left was _____</td>
<td>response requested (L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>Fifth8</td>
<td>I put my baby to bed.</td>
<td>General Info (L.A. Rempel et al., 2017)</td>
</tr>
<tr>
<td>Fifth9</td>
<td>Work together with your wife to create a safe and clean environment</td>
<td>General Info Principles (L.A. Rempel et al., 2017)</td>
</tr>
</tbody>
</table>
Fifth 10 Work together with your wife to make sure your baby has food, shelter and clothing.

Fifth 11 Use gentle control and correction as your baby develops

Fifth 12 Keep your baby from putting dangerous or dirty things in his mouth

Fifth 13 Sometimes, as a loving father, you will need to correct your baby’s actions so that your baby can learn appropriate behavior and stay safe. Be gentle and caring as you guide your baby. Harsh, angry punishment is harmful for babies.

General Info Principles (L.A. Rempel et al., 2017)
Appendix B: Message to public health nurses

Fathers, whose partners are pregnant or who have had their baby within the past month, can email Allison at dadrocksstudy@gmail.com

Allison will confirm their due date, or the infant's birth date over email, and send them an online survey.

Once they complete the survey, Allison will begin sending them text messages - about 3-5 a week.

Once the baby is 3 months, I send another survey, and another one at 6 months. These three surveys take about 30 minutes each, and the fathers can pause the survey (if they need to attend to their infant!)

They would get those messages the entire 6 months. The messages sometimes have suggestions of things that require time to do with their baby, but there is no official time commitment. They never need to meet so they can do these as work for them.

For more information, they can go to https://www.facebook.com/DadRocksNiagara/
Appendix C: Survey Questions

All were administered online.

**Pre-study demographic information.**

The following questions are designed to provide us with demographic information that has been found to be relevant in previous research. As stated earlier, be assured that this information will be kept confidential.

How old are you? _____

a) In what country were you born? _________________

b) What is your first language? _________________

Do you have older children? Yes _____ No _______

If yes, please list the gender and age of each child:

________________________________________________________________________

Is your baby already born? Y N

If not, what is your infant’s due date? ____

If yes, when were they born? ____

Is the infant male ___ or female ___?

What is your relationship to this child?

- Father (biological)
- Father (adoptive)
- Step-father
- Foster father
- Grandparent
- Other (please specify) ______________________
Couple relationship status data
  o married
  o cohabiting
  o separated
  o divorced
  o romantic
  o friends
  o acquaintance

What is your employment status?
  o Employed – full time
  o Employed – part time
  o Unemployed
  o Retired
  o Student
  o Unable to work

What is the highest level of education you completed?
  o Did not complete high school
  o Completed high school
  o Some post-secondary education
  o Post-secondary degree, diploma, or certificate (including trades)

a) If your partner is not currently working, does she intend to return to paid work or school?
   ___Yes ___No ___ Unsure
b) If yes, approximately what age will your child be when she returns to school or paid work?

____

What is your family's annual income? (circle one)

<table>
<thead>
<tr>
<th>Less than $6,000-</th>
<th>$6,000-</th>
<th>$20,000-</th>
<th>$40,000-</th>
<th>$60,000-</th>
<th>$80,000-</th>
<th>More</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6,000</td>
<td>$19,999</td>
<td>$39,999</td>
<td>$59,999</td>
<td>$79,999</td>
<td>$99,999</td>
<td>$100,000</td>
<td>Refused</td>
</tr>
</tbody>
</table>

Do you live with your baby?

Did you attend prenatal classes? Y/N If yes, which course? ______

Did you attend, or are you attending, other classes about parenting? Y N If yes, which course? ______

Where would you look for information about raising your infant? ____

Have you looked for information about raising your infant? E.g. books, online, etc. If yes, where? ______

How much time do you expect to spend with your infant? (hours)

Does your partner intend to breastfeed?

If your baby is already born, did they need to spend time in the special care unit or NICU? Y N If yes, why? _____ and for how long were they there? _____

If your baby is already born, were they born prematurely? Y N If yes, how many weeks early were they? _____

How often do you use your mobile phone? seldom, sometimes, often
How often do you carry your mobile phone with you? seldom, sometimes, often

How many text messages do you send each month? ______

Approximately how many text messages do you receive each month? ______

Is there a time of day you are usually interacting with your child?

**Mid-study demographic information.**

Do you live with your baby?

Did you attend prenatal classes? Y/N If yes, which course? ______

Did you attend, or are you attending, other classes about parenting? Y N If yes, which course? ______

Have you looked for information about raising your infant? ____ If yes, where? ______

How much time do you spend with your infant? (hours)

How often do you use your mobile phone? seldom, sometimes, often

How often do you carry your mobile phone with you? seldom, sometimes, often

Approximately how many text messages do you receive each month? ______

Is there a time of day you are usually interacting with your child?

**Post study demographic information.**

Do you live with your baby?

Did you attend, or are you attending, other classes about parenting? Y N If yes, which course? ______

Have you looked for information about raising your infant? ____ If yes, where? ______

How much time do you spend with your infant? (hours)

How often do you use your mobile phone? seldom, sometimes, often

How often do you carry your mobile phone with you? seldom, sometimes, often
Approximately how many text messages do you receive each month? _______

Is there a time of day you are usually interacting with your child?

Father’s Questionnaire

father infant relationship questionnaire.

Please indicate how often you did each of the following activities during the past month.

<table>
<thead>
<tr>
<th>Activity</th>
<th>never</th>
<th>rarely</th>
<th>occasionally</th>
<th>frequently</th>
<th>very frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work together as a couple to take care of your baby.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Buy things that your baby needs.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Give your baby a bath.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Change your baby’s diaper.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Feed your baby.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Stroke, massage, or pat your baby</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Hold your baby.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Kiss your baby.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Sing or talk to your baby.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Try to soothe and comfort your baby.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Take your baby for a walk outside.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Do a special repeated activity (e.g., play a repeat game).</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
13. Do things to make your baby smile or laugh (e.g., tickling, making faces, peek-a-boo, funny noises).

14. Play physical games (e.g., baby exercises, bouncing, lift in the air, dancing).

15. Copy your baby’s faces, noises, or actions.

16. Play during bath time.

17. Entertain your baby with baby toys (e.g., rattle, ball).

18. Dress your baby.

19. Read to your baby.

20. Try to teach your baby something new.

21. Have your baby sleep with you (e.g., fall asleep in your arms, cuddle, or rock your baby to sleep)

22. Take care of your baby when your baby is sick.

23. Bring your baby to health check-ups and immunizations.

**Parent-infant activities scale.**

Please use the following scale to indicate how often you did each of the following activities by writing your answer in the space beside each activity. If your partner is still breastfeeding your
child, please indicate how often you did the activity during the past month. If your partner has stopped breastfeeding, please indicate how often you did the activity during the time that your partner was breastfeeding.

1 = not at all  2 = rarely  3 = sometimes  4 = often  5 = very often

___ 1. Buy things that your baby needs.
___ 2. Give your baby a bath.
___ 3. Change your baby’s diaper.
___ 4. Feed your baby milk from a bottle.
___ 5. Feed your baby other food.
___ 7. Get your baby ready to go out (e.g., put warm clothes on, put baby in the car seat)
___ 8. Stroke, massage, or pat your baby
___ 9. Hold or carry your baby.
___ 10. Kiss your baby.
___ 11. Sing or talk to your baby.
___ 12. Try to soothe and comfort your baby.
___ 13. Take your baby for a walk outside.
___ 14. Do a special repeated activity (e.g., read the same book, play a repeat game).
___ 15. Do things to make your baby smile or laugh (e.g., tickling, making faces, peek-a-boo, funny noises).
___ 16. Play physical games (e.g., airplane, upside-down, dancing, bouncing).
___ 17. Copy your baby’s faces, noises, or actions.
18. Play during bath time.

19. Entertain your baby with baby toys (e.g., rattle, ball).

20. Dress your baby.

21. Read to your baby.

22. Try to teach your baby something new.

23. Have your baby sleep with you (e.g., fall asleep in your arms, cuddle, or rock your baby to sleep)

**postnatal attachment scale. [if infant already born only]**

When I am caring for the baby, I get feelings of annoyance or irritation:

- Very frequently
- Frequently
- Occasionally
- Very rarely
- Never

2. When I am caring for the baby I get feelings that the child is deliberately being difficult or trying to upset me:

- Very frequently
- Frequently
- Occasionally
- Very rarely
- Never

3. Over the last two weeks I would describe my feelings for the baby as:
4. Regarding my overall level of interaction with the baby I:
   - Feel very guilty that I am not more involved
   - Feel moderately guilty that I am not more involved
   - Feel slightly guilty that I am not more involved
   - I don’t have any guilty feelings regarding this

5. When I interact with the baby I feel:
   - Very incompetent and lacking in confidence
   - Moderately incompetent and lacking in confidence
   - Moderately competent and confident
   - Very competent and confident

6. When I am with the baby I feel tense and anxious:
   - Very frequently
   - Frequently
   - Occasionally
   - Almost never

7. When I am with the baby and other people are present, I feel proud of the baby:
   - Very frequently
   - Frequently

   o Dislike
   o No strong feelings towards the baby
   o Slight affection
   o Moderate affection
   o Intense affection
8. I try to involve myself as much as I possibly can PLAYING with the baby:
   - Occasionally
   - Almost never

   - This is true
   - This is untrue

9. When I must leave the baby:
   - I usually feel rather sad (or it's difficult to leave)
   - I often feel rather sad (or it's difficult to leave)
   - I have mixed feelings of both sadness and relief
   - I often feel rather relieved (and it's easy to leave)
   - I usually feel rather relieved (and it's easy to leave)

10. When I am with the baby:
    - I always get a lot of enjoyment/satisfaction
    - I frequently get a lot of enjoyment/satisfaction
    - I occasionally get a lot of enjoyment/satisfaction
    - I very rarely get a lot of enjoyment/satisfaction

11. When I am not with the baby, I find myself thinking about the baby:
    - Almost all the time
    - Very frequently
    - Frequently
    - Occasionally
    - Not at all

12. When I am with the baby:
I usually try to prolong the time I spend with him/her

I usually try to shorten the time I spend with him/her

13. When I have been away from the baby for a while and I am about to be with him/her again, I usually feel:

- Intense pleasure at the idea
- Moderate pleasure at the idea
- Mild pleasure at the idea
- No feelings at all about the idea
- Negative feelings about the idea

14. I now think of the baby as:

- Very much my own baby
- A bit like my own baby
- Not yet really my own baby

15. Regarding the things that we have had to give up because of the baby:

- I find that I resent it quite a lot
- I find that I resent it a moderate amount
- I find that I resent it a bit
- I don't resent it at all

16. Over the past three months, I have felt that I do not have enough time for myself or to pursue my own interests:

- Almost all the time
- Very frequently
- Occasionally
17. Taking care of this baby is a heavy burden of responsibility. I believe this is:
   - Very much so
   - Somewhat so
   - Slightly so
   - Not at all

18. I trust my own judgment in deciding what the baby needs:
   - Almost never
   - Occasionally
   - Most of the time
   - Almost all the time

19. Usually when I am with the baby:
   - I am very impatient
   - I am a bit impatient
   - I am moderately patient
   - I am extremely patient

**attitudes toward father-infant relationship.**

*Please indicate how much you agree with the following statements.*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fathers need to be part of a team with mothers to jointly care for their babies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
2. It is not good for a father to spend a lot of time with his baby
3. It is important for fathers to pay attention to what their baby needs and respond in a way that is best for the baby
4. It is not good for fathers to hold and cuddle their babies a lot
5. My baby likes listening to me talk and sing
6. I like to help my baby explore and learn
7. It is fun to play with my baby
8. Fathers need to use strict and firm discipline with their babies
9. The most important thing that a father can do is to provide for his baby’s basic physical needs

relationship quality.

Please indicate how true each of the following statements is about your relationship with your partner.

1. I communicate well with my partner.
2. I feel that I really understand my partner.

3. I feel that my partner really understands me.

4. I am willing to share myself and my possessions with my partner.

5. I feel emotionally close to my partner.

6. I am extremely happy with my current romantic relationship.

7. I have a very strong relationship with my partner.

8. I am perfectly satisfied in my relationship.
9. When we are dealing with an issue that is important to me, I feel confident that my partner will put my feelings first.

   not at  0  1  2  3  4  5  6  7  8  9  10  completely all

10. My partner is a thoroughly dependable person.

   not at  0  1  2  3  4  5  6  7  8  9  10  completely all

11. I am certain that my partner will always value and appreciate me, no matter what happens.

   not at  0  1  2  3  4  5  6  7  8  9  10  completely all

12. I feel confident that my partner will never intentionally do anything to hurt me or jeopardize our relationship.

   not at  0  1  2  3  4  5  6  7  8  9  10  completely all

13. I feel that I can trust my partner completely.

   not at  0  1  2  3  4  5  6  7  8  9  10  completely all

14. I am very committed to maintaining my relationship.

   not at  0  1  2  3  4  5  6  7  8  9  10  completely all

15. I have made a firm promise to myself to do everything in my power to make my relationship work.
16. I do not feel any moral duty or obligation to continue my relationship.

**perceived behavioural control questions.**

1. “I feel I am capable of interacting with my infant in any way he or she needs”
   
   strongly agree 1 2 3 4 5 6 7 strongly disagree

2. The decision to care for my infant is beyond my control
   
   strongly agree 1 2 3 4 5 6 7 strongly disagree

3. For me to care for my infant is
   
   easy 1 2 3 4 5 6 7 difficult

4. “My wife will not allow me to take care of with my infant without supervision”
   
   strongly agree 1 2 3 4 5 6 7 strongly disagree

5. The amount my child needs to be with their mother, e.g. to feed, makes it hard to be involved.
   
   strongly agree 1 2 3 4 5 6 7 strongly disagree

6. There is not enough information available for me to know how to care for and interact with my baby.
   
   strongly agree 1 2 3 4 5 6 7 strongly disagree
Anxiety (6-item STAI)

A number of statements which people have used to describe themselves are given below. Read each statement and then select which statement to indicates how you feel right now, at this moment.

There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Moderately</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel calm</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I am tense</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I feel upset</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I am relaxed</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I feel content</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I am worried</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

feasibility questions (intervention group only).

We now have some questions about the text messages.

Were you satisfied with the messages? Y/N

Did you feel the text messages were:
Meaningful 1………………………………... 7 Meaningless
Bothersome 1………………………………... 7 Unobtrusive
Helpful 1………………………………... 7 Not Helpful
Joyful 1………………………………... 7 Stressful
Surprising 1………………………………... 7 Predictable
Attention-Grabbing 1………………………………... 7 Unspectacular
Interesting 1………………………………... 7 Boring

**process evaluation questions [intervention participants only].**

*Please indicate how much you agree with the following statements:*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoyed the messages sent to me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The messages gave me useful information about being an involved father.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am reading the messages and doing the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>activities with my infant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The messages helped me to understand what my</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>baby can do.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I engaged in the discussions on Facebook</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I referred to the content in the messages when I</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>was unsure of something.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I used the suggested resources (e.g. Parent Talk Line, links to websites) when I was unsure of something.

I am liking the study

I feel the messages are relevant to me and my family.

I used the suggestions from the text messages of things to do with my infant

I felt the study overall was interesting to complete

open ended question.

Anything else you would like to tell us? ______________________________

In a perfect world, what should we change for the next part of the study for you? __________________________
Appendix D: Write in response at three-months

The below is the written responses from fathers, to the question “In a perfect world, what should we change for the next part of the study?”.

Content of messages could be more helpful.

“I would have appreciated more thought provoking suggestions and facts from the text messages. I felt the information sent in the text to be borderline demeaning and underestimated my intelligence. I found many of the suggestions to be unnecessary. Most messages contained information I already knew about child development and/or were activities I actively participate in with my baby on a daily basis.” P14

“Find a way to make the text messages interactive” P7

“The text messages seem unhelpful and are confusing, as some are information-based, some are simply quotes, and many are repetitive. In addition, multiple text messages that directed to facebook surveys etc, directed to the facebook page, but with no sight of the surveys that were referred to. It has been a deterrent to trying to engage with the resources because of reliability” P1 **note from Allison – this was changed for subsequent participants, where links to FB page were removed.

Content of messages designed for fathers with knowledge

“Taylor messages to the level of the father (I could use less basic messages, more ideas of games to play with my daughter)” P13

“Make messages more applicable for dads with more than one child - I found them extremely obvious, but I have three children. Perhaps topics relating to how siblings can play/help/assist baby and parents” P9
“Feels like the study is geared more towards fathers who are having their first child. A lot of the questions deal with interacting with your new infant. Would have liked more info on how to balance between both children. Survey questions are also geared towards care of the infant, of which I am doing a lot of those things, but more with my oldest child. Perhaps new parents and second time parents should be grouped into different categories.” P8

“Study is geared towards father's who are having trouble getting involved in there babies lives.” P10

More intensive intervention

“More tips of how to interact with baby, please. ; In a perfect world, video us interacting with our baby so you have a good measure of behaviour! Then give us some feedback/suggestions. ; ; I didn’t like that some of the developmental stuff was beyond my baby’s current capability. Even if it’s true, I don’t like thinking she’s behind.” P12

“Force dads to meet each other and talk about it - that is something that never happens. You have baby talk groups with moms...but I wasn't aware of any for dads. I'm also not sure as to how many dads would be motivated to go.” P2

Positive feedback

“I'm not sure. I think you're doing a great job. I don't have anything to compare though... maybe you're doing a horrible job and I don't know? haha. jokes :)

“P6

Fathers excluded from analysis

“I didn't get any messages? ?” P17 *Note from Allison – he had entered his phone number wrong on the survey. He is not included in analysis “
“I don't own a cellphone so you should find a way to communicate with all participants equally. My wife gets the text messages and tells me the content occasionally.” P5 **note from Allison – he was not included in the analysis

**Feedback on study questions and design**

“Some of your questions only have answers that are one extreme or the other. People who are content with the status quo have no real answer. For example in one question I could chose that I’m sad to leave my baby, or I’m relieved mto leave my baby. Neither of these are true. I need to leave every day to go to work, I’m neither sad nor relieved to do that... she’ll be there when I get home...i have no real emotion about it.” P16
Appendix E: Write in response - six-months - suggested changes.

The below is the written responses from fathers, to the question “In a perfect world, what should we change for the next part of the study?” when the infants were six-months.

**Content of messages could be more helpful.**

“Less obvious tips” P4

**Content of messages designed for fathers with knowledge**

“Information for integrating new baby into a family with children already, ie. a second, third, etc. child.” P12

**More intensive intervention**

“Intervention! I’d love to do a one day workshop for dad’s (with mom’s present too). ; ;

Maybe more texts with practical suggestions “e.g, if your baby is doing X then try Y next.” ; ; Some sort of behavioural measure. I think Diane Mack, a prof at Brock has done work with individuals wearing cameras. If you could do this with dad’s you’d get a great objective measure of behaviour with their infant.” P16

**Positive feedback**

“I don't know. I don't really know what the goal of the study is; I just liked the idea of helping someone further their research on infant-father relationships. And I get to tell someone how much I love my baby.” P10

**Feedback on study questions and design**

“Some questions I, personally, felt difficult to answer. I am self employed and work from home a fair bit, so my answers regarding time with baby/text messages/phone use reflect that. I’m not sure if these answers will sc ew your study, if so, I’m sorry.” P9
“The Facebook links often did not work, which caused me to stop ever trying to see them. Working links would be one improvement.” P1

Fathers excluded from analysis

“Emails or other forms of communication as I don't own a cell phone. The questions were interesting but I one hundred percent didn't get any text messages.” P5

*note from Allison – he was not included in the analysis
Appendix F: Write in response, baseline, open ended.

The below is the written responses from fathers, to the question “Is there anything else you want to tell us” at baseline.

Feedback on study questions and design

“I found some of the questions to be difficult to answer, since our son is only 4 days old, and we don’t have any “past three-months” experience. ; Also, some questions like “the needs of my child are the most important to me”…. while I completely agree with this statement, I find it equally important be supportive of my wife…. so “most important” might be skewed because of these things.; :-)” P7

“Some of your questions are irrelevant for a newborn (1 week) old baby. I also feel like you have some bias in your options. For example the try to make visits with baby longer or shorter. You have no “not change” option which I think will give you a falsely high “spend more time” P8”

Other comments

“I facilitate a dads group for a pregnancy resource centre, and have found preparing for the group to be extremely enlightening. I am also on parental leave from work for the next 6 months, til October 2018” P2

“Home birthing went great, after my wife had to go to the hospital and get a blood transfusion. She was hardly able to move and the bedside manner at the hospital was bad, along with being awake for 24 hours straight we where both emotionally and physically worn out. I feel more care should have been seen to both my wife baby and me.” P12
“I am not taking paternity leave because I am starting a new job in a couple months.”

P11

Fathers excluded from the analysis

“In regards to the Cell Phone questions. We have 1 phone that stays in the diaper bag in case of emergencies. So it is almost never used.” P10 **note from Allison – he was not included in the analysis

Appendix G: Write in response - three-months.

The below is the written responses from fathers, to the question “Is there anything else you want to tell us”.

Positive Feedback

“I’m really enjoying the study. I’m glad it keeps going for another three-months. Thank you!” P12

“I appreciate the messages - my wife and I always look forward to getting them, though we find them comically obvious, as we have three children. However, it gives us an opportunity to discuss family and our relationship.” P9

Other comments

“I am the working parent; my fiancee is the stay-at-home mom. Your study asked if the baby's need for mom (e.g. feeding) limited my opportunity to be with baby myself, but nothing about being away at a job. So I don't spend a lot of time with my little one :(.” P4

“our baby is the best baby ever. compared to most babies we've known, he is very low maintenance. hopefully that never changes *knock on wood*” P6
“Some of your questions only have answers that are one extreme or the other. People who are content with the status quo have no real answer. For example in one question I could chose that I’m sad to leave my baby, or I’m relieved mto leave my baby. Neither of these are true. I need to leave every day to go to work, I’m neither sad nor relieved to do that... she’ll be there when I get home...i have no real emotion about it.” P16

“More tips of how to interact with baby, please. ; In a perfect world, video us interacting with our baby so you have a good measure of behaviour! Then give us some feedback/suggestions. ; ; I didn’t like that some of the developmental stuff was beyond my baby’s current capability. Even if it’s true, I don’t like thinking she’s behind.” P12
Appendix H: Write in responses - six-months - open ended

The below is the written responses from fathers, to the question “Is there anything else you want to tell us”.

Positive Feedback

“Thanks for this opportunity. I’d be happy to participate in future studies if you are looking for participants. Please feel free to contact me.” P13

Request for more information

“I’d like to know where/when we can find the results of the study if possible. I’m curious to know what my answers helped compile, and see how other dads are with their babies.” P9

Other comments

“I feel less involved with every subsequent child but I feel more capable and less stressed at the same time. This is also the first kid that I have not taken immediate paternity leave as mine starts next month.” P9

Comments on study design

“I don't remember if I completed the survey. Suggest emailing only those who haven't completed it.” P16 *note from Allison – he did not complete this survey, which is why he was sent it.