A Web-based Intervention for Postpartum Depression

An Assessment of User Acceptability and Information System Evaluation

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Abstract

Treating and preventing postpartum depression is related to a number of attitudinal and practical barriers. Addressing these barriers are web-interventions using persuasive technology, aiming to identify women at risk, prevent development of depressive symptoms, and increase subjective well-being. The purpose of this study was to investigate persuasive features and acceptability among users of "Mamma Mia"; a web-intervention for perinatal depression. Based on mixed-model design, semi-structured interviews were conducted on ten perinatal well-educated, employed women with partners (age 28-41). The statements derived from the interviews were unitized and coded into two theoretical and methodological frameworks; SWOT and Persuasive Systems Design (PSD) Model. Results from content and thematic analyses show that the PSD-model and SWOT framework capture significant aspects and qualities of persuasive features in explaining information systems' interaction with its users. Thematic analysis indicates that the "Mamma Mia" intervention is perceived as acceptable, and professional, which are qualities predicting adherence. The study contributes support for assessing persuasive features to develop successful persuasive systems, utilizing specific persuasive features that predict adherence, and qualities of features to enhance user satisfaction, and effectiveness of mental health interventions.

Keywords: perinatal/postpartum depression, web-based interventions, Persuasive Systems Design, Behavior Change Support Systems

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Depression is a troubling disorder to have at any point in time, but postpartum depression (PPD) is especially problematic for a new mother who in her despair is also caring for an infant completely dependent on her. PPD creates personal suffering and weakens the ability to function in everyday life (O'Hara, 2009; O'Hara & McCabe, 2013). Approximately 10-15% of women are estimated to develop postpartum depression, with onset normally set within the first year following birth (Haga, Lynne, Slinning, & Kraft, 2012). Moreover, some argue that onset might be antenatal or postnatal (Dennis & Dowsell, 2013). PPD falls under the category of major depressive disorders, entailing similar description, symptoms, course and outcomes. The main factor separating PPD from a major depressive disorder is the time of occurrence (Haga, Lynne, et al., 2012). PPD can further be distinguished between what is commonly known as the "baby blues", a less severe mood disturbance which affects 40-80% of women, and postpartum psychosis, a more severe disorder affecting between one in 500 to one in 1000 women (DSM-IV, 2002).

Symptoms

The most common symptoms of PPD are feelings of hopelessness, inability to cope with the new baby, tearfulness, feeling irritated and anxious, experiencing loss of appetite, poor concentration and memory, sleep deprivation and fatigue. Symptoms may also include social isolation, feelings of inadequacy, the mother seeing herself as a bad and unloving parent (Haga, Lynne, et al., 2012), and in severe cases, suicidal ideation (Lindahl, Pearson, & Colpe, 2005). Self-contemplating, self-blame, and catastrophic thinking are also associated symptoms of PPD (Haga, Ulleberg, Slinning, Kraft, Steen, & Staff, 2012). The symptoms of PPD may be difficult to distinguish from symptoms normally observed in postpartum women such as tiredness, changes in sleep, appetite, and sexual desire (i.e., symptoms that are normally observed in women after giving childbirth and taking care of a newborn baby), making it difficult for health professionals to detect women with PPD (O'Hara & McGabe, 2013).

Increased depressive symptoms during the transition into motherhood predict decreased family-focus and increased self-focus (Salmela-Aro, Nurmi, Saisto, & Halmesäki, 2001). Increased self-focus in PPD is associated with maternal negativity, which can interfere with a healthy mother-child interaction, displaying hostility, rejection or non-contingent

responding to the infant's signals (Dietz, Jennings, Kelley & Marshal, 2009). An insensitive or unresponsive mother may show be lacking in predictability, physical stimulation, emotional interplay, engagement, and affect (Milgrom, Ericksen, McCarthy & Gemmill, 2006; Field, Sandberg, Garcia, Vega-Lahr, Goldstein, & Guy, 1985). Infants are substantially affected and highly sensitive to the quality of interpersonal contact and the care they receive (Grace, Evindar, & Stewart, 2003), being able to detect the affective quality of an interaction, and modify its affective display in response (Cohn & Tronick, 1983).

Depressed mothers have an impaired ability to recognize non-verbal affective cues from the infant (Field et al., 1985; Arteche, et al., 2011), and by lacking empathic attunement and response; it becomes difficult to modulate the infant's distress (Milgrom et al., 2006). The mother-child relationship is determined by the quality of their interaction (Arteche, et al., 2011). Practicing maladaptive caretaking behaviors, mothers with PPD often care less about the safety and well-being of their children, and are less likely to attend well-baby clinics and practice healthy eating and sleeping habits Mothers with PPD often lack knowledge about nurturing and sensitive parenting, and show overall poor parenting practices (Zajicek-Farber, 2009). Depressive symptoms in mothers are also associated with a higher risk of neglect and abusive behaviors towards their children (Cadzow & Armstrong, 1999), and practice of physical punishment (Zajicek-Farber, 2009).

Consequences

In the postpartum period, the mother makes up much of the newborn infants' social environment, which determines, to a great extent, how the infant experiences his or her external world (Grace, et al., 2003). It is thus not surprising that early and long-lasting exposure to maternal depression may interfere with a child's development (Brennan, Hammen, Andersen, Bor, Najman, & Williams, 2000) and concurrent depressive symptoms may cause effects expanding into adolescence, particularly among boys (Korhonen, Luoma, Salmelin, & Tamminen, 2012). PPD may have adverse consequences on the child's cognitive (Cogill, Caplan, Alexandra, Robson, & Kumar 1986) and behavioral development, (Goodman, Rouse, Connell, Broth, Hall & Heyward, 2011), as well as adverse outcomes on mother's health (Eberhard-Gran, Slinning, & Rognerud, 2014), such as recurring depressive episodes (Josefsson & Sydsjö, 2007). Further, PPD is associated with psychological maladjustment, a higher neurotic and antisocial behavior (Murray, Sinclair, Cooper, Ducournau, Turner, & Stein, 1999), impaired motor development in infants (Lyons-Ruth, Zoll, Connel & Grunebaum, 1986), and adolescent depression (Pearson et al., 2013).

An enduring effect on the interpersonal relationship between the mother and her infant may be due to the insecure infant attachment established within this period (Stein, Gath, Bucher, Day, & Cooper, 1991). Typically, the mother and child show less mutually responsiveness and interactive behavior (Field, et al., 1985). Even after remission, these effects were found, although somewhat reduced, possibly due to the mothers persisting hostility and difficulties in family relationships (Stein, et al., 1991). In fact, the initial attitude towards the infant may set up a cycle of difficulties that influence the child (Murray, et al., 1999). PPD may not be a sole predictor of negative child outcomes, but it is nonetheless critical to address because of its timing.

Risk Factors

There are no single causing risk factor by which women develop PPD (Dennis & Hodnett, 2007). The strongest identified risk factors from extensive research include psychiatric history/ prenatal depression, prenatal anxiety, low social support, stressful life-events, marital conflict, and low self-esteem (Beck, 2001). Further, antenatal depression is considered a strong risk factor for PPD. Smaller, but significant risk factors include neuroticism, negative cognitive attribution style (O'Hara & Swain, 1996), marital and socioeconomic status (Beck, 2001), and abusive history (Ross & Dennis, 2009). Additional factors specific to PDD includes parenting stress, unplanned/unwanted pregnancy, infant temperament, maternity blues (Beck, 2001), obstetric difficulties (O'Hara & Swain, 1996), and young mothers (Brown, Harris, Woods, Buman, & Cox, 2012). A mother's personal approach to motherhood may also become a moderator for the severity of depressive symptoms. Women with a need for control have a greater expectation towards birth and motherhood, and are thus more prone to react negatively when these expectations are not met. Unable to neither master nor adjust these expectations may lead to a great deal of self-focus and emotional discomfort (Haga, Lynne, et al., 2012).

Many of the risk factors identified are similar to those of a general depression (Bernazzani, Saucier, David, & Borgeat, 1997), primarily distinguishable by some postpartum-specific factors, like sensitivity to hormonal changes (Bloch et al., 2000; DSM-IV, 2002), or obstetric complications (Bernazzani, et al., 1997). More research is needed on the complex interaction of biological, psychological and psychosocial risk factors considering the individual differences (Dennis, 2005). Risk factors for developing depressive symptoms are different than the predictors for recovery from depression (Brugha, et al., 1998).

Barriers for Treatment

Depressed mothers' beliefs and attitudes can often form barriers that results in lack of treatment for PPD (Dennis & Chung-Lee, 2006). Many women with depressive symptoms are reluctant or unable to seek help, mostly because of the stigma associated with PPD (Danaher, et al., 2012). Practical aspects of childcare, lack of motivation, fatigue, perceived social pressure, and fear of losing custody are also common barriers for seeking help (Dennis & Chung-Lee, 2006). Women have also reported difficulties finding normalizing information on motherhood, lack of social support, problems adjusting to and managing a busy schedule, and balancing infant care with other responsibilities (O'Mahen, Fedock, Henshaw, Himle, Forman & Flynn, 2012). It is important to raise awareness about the symptoms and signs of the disorder as well as provide normalizing information to clarify common misconceptions (Dennis & Chung-Lee, 2006). Early identification, prevention, and adequate treatment can reduce the duration and severity of the disorder (Beck, 2001).

Treatments

Primary care treatment of PPD normally includes appropriate medical care such as pharmacotherapy, and routine follow-up by a health care professional. However, postpartum women are advised to use antidepressants with caution, due to concerns of transmitting the antidepressants to their infant through breastfeeding. Many women report an unwillingness to take antidepressants for this and other reasons. This together with the barriers related to face-to-face therapy calls for effective alternatives (Dennis, Ross, & Grigoriadis, 2007). Psychological and psychosocial interventions are proven to be as clinically effective as primary care (Morrell, Slade, et al., 2009).

Psychosocial Interventions

Non-directive Counseling derived from a randomized controlled trial study of a health-visitor intervention, where trained health visitors (nurses, counselors or midwives) visited women with PPD for eight weeks of counseling-sessions. Results were positive for treating mild to moderate PPD compared to control group (Holden, Sagovsky, & Cox, 1989), and were even more effective in identifying and treating PPD when combined with either Cognitive Behavior Therapy (CBT), or a person-centered approach (Morrell, Warner, Slade, Dixon, Walter, Paley & Brugha, 2009). Further, a combination of antidepressant drugs and counseling were more effective than drugs alone (Holden, et al., 1989), and appeared to be just as effective as Cognitive Behavior Therapy in treating mild PDD (Prendergast & Austin, 2001).

A *typical group session intervention* includes discussion concerning the transition into

motherhood, coping with postpartum stress, communication skills and life planning (Chen, Tseng, Chou, & Wang, 2000). Connecting with other mothers is considered valuable for practical support and for sharing common interests and needs. Haga and colleagues (2012), however, argue that although comforting in a time of uncertainty, this flow of information and normalizing within a group can lead to self-monitoring and social comparison, which may have an adverse effect on well-being (Haga, Lynne et al., 2012). Other studies have found decreased depressive symptoms, and increase in interpersonal functioning as an outcome of group sessions (Chen, et al., 2000). However, research suggests that few postpartum women attend group sessions (Dennis, 2005).

Psychological Interventions

Cognitive Behavioral Therapy help patients to identify and correct misconceptions and beliefs of information processing that determine how we respond to events in terms of affect and behavior. Meta-analyses on the effectiveness of cognitive therapy for postpartum depression, (Dodson, 1989; DeRubeis, Gelfand, Tang & Simons, 1999), show that cognitive therapy is superior to other forms of psychotherapy, and is more effective than nothing at all, behavior therapy, or pharmacotherapy. Results also show that CBT is just as effective as antidepressant medication in treating acute, severe depression (Appleby, Warner, Whitton & Faragher, 1997), and is reasonably well-accepted among patients (Chabrol, Teissedre, Saint-Jean, Teisseyre, Rogé & Mullet, 2002). There are limitations to CBT in that it requires a considerable amount time and cost from the patients, with attrition rates between 10 to 40 % (Dennis & Hodnett, 2007).

Interpersonal psychotherapy (IPT) is a time-limited treatment provided by healthcare professionals, aiming to reduce depressive symptoms and improve patient's interpersonal functioning (Klerman & Weissman, 1993). IPT is a primary treatment for acute depression, long-term prevention, and as an adjuvant to antidepressant medication for relapse prevention (Stuart & O'Hara, 1995). A study conducted to test the efficacy of IPT, found that it reduced depressive symptoms and improved maternal mood and social functioning (O'Hara, Stuart, Gorman & Wenzel, 2000). Efficacy compared to CBT or counseling is unknown (Cooper, Murray, Wilson, & Romaniuk, 2003).

Psychodynamic therapy is an insight-oriented therapy, based on the notion that unconscious processes are manifested in an individual's behavior (Dennis & Hodnett, 2007). A study on the efficacy of treatment interventions found that psychodynamic therapy was efficacious in reducing depressive rate (Cooper, et al., 2003). A study comparing efficacy of

psychodynamic psychotherapy to CBT in treating depression, found equal efficacy in treating depression, with no significant difference in outcome (Leichsenring, 2001).

Another effective treatment option to PPD is *psycho-educational therapy*. The psycho-educational treatment can be individual, group or self-help via books, web or television, focusing on teaching a set of skills to help patients cope with depression, modified to the needs consistent with the patient's disorder (Cujipers, Muños, Clarke, & Lewinsohn, 2009). A widely utilized treatment within psycho-educational therapy is the "Coping With Depression"- course (CWD). This intervention is for prevention, treatment, and relapse prevention for PPD, based on principles from CBT, and is found to be effective in preventing depressive disorders, and in treating existing depression. However, CWD was found to be less efficacious than other therapy forms of depression, although no such effect was found when CWD was compared directly to other psychotherapies (Cujipers, et al., 2009).

Prevention

A focus on prevention may reduce many maternal depression-related consequences (Milgrom, et al., 2006). Individualized preventions taking into account the differences between risk factors are most likely to be beneficial (Dennis & Dowsell, 2013). Despite a range of interventions transferring knowledge of risk factors into predictive measures and preventions, there has been limited success (Dennis, 2005).

Earlier research found no indication that women at risk for maternal depression benefit from preventive treatments (Stuart & O'Hara, 1995; Dennis, 2005). More recent studies, however, indicate that certain preventive interventions are effective in reducing depression in high-risk women, including telephone-based peer support (Dennis, et al., 2009), provision of postpartum intensive professional home visits (Armstrong, Fraser, Dadds, & Morris, 1999), and interpersonal psychotherapy (Zlotnick, Johnson, Miller, Pearlstein, & Howard, 2001; Zlotnick, Miller, Pearlstein, Howard. & Sweeney, 2006). Efficacy of giving antidepressants immediately postpartum as prevention for PPD is unclear, due to lack of evidence and sufficient research (Howard, Hoffbrand, Henshaw, Boath, & Bradley, 2005).

The perception of social support is an essential aspect in preventing PPD (Haga, Ulleberg et al., 2012). Women experiencing lack of support or feeling isolated is shown to have increased depressive symptoms (Dennis, et al., 2009). Indeed, social support has consistently been found to be essential in facilitating well-being and prevent development of depression by affecting how they cope with stress (Haga, Lynne, et al., 2012). A beneficial preventative action would be to facilitate support between mothers and their partners and immediate family (Brugha et al., 1998; Haga, Ulleberg et al., 2012). Further, interventions

providing intensive and professional support initiated postpartum show most promise in preventing PPD, and individual-based interventions targeting risk women, are more likely to be beneficial (Dennis, 2005).

Web-Based Interventions

Many public health care services do not provide assessment of psychological and emotional state in prenatal and postnatal women. Therefore, there is a need for interventions detecting and preventing depressive symptoms in these women in order to reduce prolonged suffering and chronicity (Osma, Crespo, Medrano, & Serrano, 2014). Consequently, there have been emerging studies over the last decade that addresses the need for alternative interventions, focusing on creating professional web-based interventions for preventing and treating PPD. However, most of these interventions are in need for more controlled trials that evaluate the effects of using web-based interventions for treating and preventing PPD (Danaher et al., 2013). The aim is to provide women with an accessible and tailored treatment that meets the mothers' needs, and with regard for the time limitations and attention constraint that is involved in early motherhood. This includes normalizing information about motherhood, the importance of interpersonal support, and infant care as well as addressing postpartum-specific concerns (O'Mahen, Woodford, McGinley, Warren, Richards, Lynch & Taylor, 2013).

Technology-based interventions are more flexible and accessible, and may reach a larger proportion of mothers who would otherwise not attend traditional treatment. Home support intervention utilizes email, web-programs, or telephone (Dennis & Chung-Lee, 2006). Receiving home-based therapy at a time and place convenient for the patient diminish some of the practical barriers for postpartum women who are under the commitment of childcare, and in general lack of time and excess energy (Henshaw, Flynn, Himle, O'Mahen, Forman, & Fedock, 2011). Additionally, it provides anonymity by not having to attend a clinic in person, which can reduce feelings of stigma associated with depression (Dennis & Chung-Lee, 2006).

One internet-based intervention included online support to strengthen parenting satisfaction and self-efficacy, combining psychoeducation, peer-discussions through forums and expert advice. Although there were no indications that the intervention effected depressive symptoms or mothers' perception of parenting satisfaction, mothers did experience higher infant centrality in the first months postpartum (Salonen, Pridham, Brown, & Kaunonen, 2014).

Further, a professional education, peer-reviewed web-site was designed to further educate health care professionals who treat women who have or are at risk for postpartum

depression (PPD), and to provide information for women with PPD and their friends and family members. The web-site provides tools to detect, diagnose, treat and refer women with PPD, promoting education and training in PPD treatment that is flexible and cost-effective, thus being able to reach a large number of health care professionals. The program have received positive feedback from both consumers and health care professionals (Wisner, Logsdon, & Shanahan, 2008).

There is considerable evidence emerging, indicating that therapist-assisted internet-delivered cognitive behavior therapy (ICBT) effectively improves depressive symptoms, comparable to effects of face-to-face therapy (Cujipers, Donker, van Straten, & Andersson, 2010).

The MomMoodBooster program; an interactive web-based intervention for postpartum depression, utilizes cognitive and behavioral strategies to deal with pessimism, attributions for failure, and low self-esteem among other topics. In the pilot study, the intervention showed significant improvements on depression over the course of the program, as well as sustainability of these improvements over a six-month follow-up. The program had a high participant engagement and low attrition (Danaher et al., 2013).

A case study illustrated therapist-assisted ICBT specifically for PPD. The intervention included a seven-module intervention and email-exchanges between user and therapist, and resulted in a reduction of depressive symptoms, as well as decreased anxiety and parental stress. However, further studies on effectiveness of these interventions should be conducted to evaluate its competency to treat PPD. The indications of this case study aligns with the preliminary evidence of Danaher and colleagues (2013), in support of internet therapy for the treatment of PPD (Pugh, Hadjistavropoulos, & Fuchs, 2014).

Another intervention for PPD is the Netmums Helping With Depression (NetmumsHWD); a 11-session web-based treatment, based on components of CBT (O'Mahen, Woodford et al., 2013). The NetmumsHWD has utilized only the behavioral components and has shown to be as effective as CBT. Despite high attrition rates, studies show clinical efficacy (O'Mahen, Richards, Woodford, Wilkinson, McGinley, Taylor, Warren, 2013).

The current study evolves around the "Mamma Mia" program; a web-based self-help intervention that aims to reduce the risk of developing perinatal depression, to treat women with mild-to-moderate symptoms of depression, and enhance subjective well-being. Mamma Mia is based on positive psychology, metacognitive therapy, and couples therapy. Furthermore, assessment of depressive symptoms, psycho-education and breastfeeding are

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components used in the intervention. The psycho-education has the intention of providing information relevant to the mother and child adjusted to the current progress in the pregnancy (Haga, Drozd, Brendryen & Slinning, 2013).

Behavior Change Support System

A key concept for web science research is the concept of behavior change support system, a human-web interaction through web that is used to influence people's behaviors. (Oinas-kukkonen, 2010b). A behavior change support system (BCSS) is an information system (e.g. health-promoting web-based interventions) designed to form, alter or reinforce attitudes, behaviors or an act of complying without using deception, coercion or inducements (Oinas-Kukkonen, 2010a). The concept of BCSS was originally provided to describe consumer health application. In fact, how these information systems are being perceived by its users may affect how and if such systems are being used. For instance, lack of perceived credibility or perceived benefit could become barriers for use. Thus, the users acceptability of an information system is critical for implementation and adherence. Ultimately, the user influence the information systems' design, development, deployment, adoption, and use (Drozd, Lehto, & Oinas-Kukkonen, 2012).

A key element in behavior change is persuasion, thus BCSS should build upon persuasive systems design and technology (Oinas-kukkonen, 2010b). These persuasion systems aim to change the user's attitudes or behavior by building their motivation and own goal-setting, and simultaneously providing the user with a positive experience further encouraging regular usage over an extended period of time.

Behavior change support utilizes either computer-mediated support, meaning person-to-person persuasion through email, social network or discussion forums, or computer-human persuasion meaning communication between human and computer. In the latter, the system-operators (program distributors) are the communicators/ persuaders (Oinas-Kukkonen, 2010a). Because interactive information technologies are being rapidly developed in such domains as mental health and well being, it is important to understand the qualities and processes behind them.

Aims of the Study

The main objective for this study was to gain insight into participants' experiences and reception of a web-based intervention for perinatal depression. More specifically, the study aimed to acquire an understanding of the acceptability of the intervention amongst its users. The study investigates positive and negative factors that could affect adherence, as well as possible deficiencies or need for further development, through a SWOT framework.

Further, the study aims to acquire an understanding of the intervention's potential to promote health and well-being. Specifically, the objective is to obtain a deeper comprehension of the persuasive system features within the system, and how these may effectively help enhance the interaction between the user and the information system. Applying the Persuasive Systems Design (PSD)-model to this web-based intervention, provides systematically insight at how persuasive system design features are used and to investigate their possible influence on adherence. The research questions were approached through gathering qualitative data, and conducting both qualitative and quantitative research analysis.

Methods

Study Design

This study used a mixed model design by collecting qualitative data, and unitizing data to quantifiable units, thereby making it possible to analyze the data statistically as well. It is important to use qualitative gathering of data in such domains, to get valuable insight in the user's perception, otherwise not obtained from quantitative gathering. A mixed model design is where qualitative and quantitative approaches within or across the stages of the research process is mixed (Johnson & Onwuegbuzie, 2004). First, the qualitative data were collected by means of semi-structured interviews. Second, the qualitative data were quantified using content analysis. Finally, after transcribing and unitizing the data, the units were coded under two methodological or theoretical frameworks: (1) the Strengths, Weaknesses, Opportunities, and Threats (SWOT) methodology and the (2) Persuasive Systems Design (PSD) model, and were statistically and qualitatively analyzed.

The Persuasive Systems Design Model

To investigate the information system features of the web-based Internet intervention "Mamma Mia", the Persuasion Systems Design Model was employed. The PSD model is designed to provide an understanding of the relationship and interaction between human and computer in health promoting web-based interventions (i.e., behavior change support systems). The system features of the PSD-model are categorized as providing *primary task support, dialogue support*, *system credibility*, or *social support. Primary task support* provides support to carry out the user's primary task (i.e., to prevent or treat perinatal depressive symptoms and increase subjective well-being in the current study). *Dialogue support* provides support for implementation of human-computer dialogue in a manner that helps and motivates user moving towards their goal or target behavior. *System credibility* describes the trustworthiness and reliability of the system which influences user's decisions,

behaviors and engagement with the system. *Social support* is motivating by leveraging social influence (Oinas-Kukkonen & Harjumaa, 2008).

Participants

Participants were recruited through a randomized controlled trial (RCT), where they gave their voluntarily consent to be contacted for a follow-up interview about the program. Participants randomly assigned to receive the Internet intervention were eligible for interview. All participants were enrolled for the study, the intervention, and invited for an interview, consecutively. Inclusion criteria for being invited for interview were either: (a) completing the intervention or (b) no program activity during the last 4 weeks or (c) lagging 3 or more sessions behind prescribed intervention schedule. Participants fulfilling the two latter criteria were defined as drop-outs. The criteria for participation in the study was being 18 years or older, and being pregnant between gestation week 21 and 25. There were 10 participants partaking in the study, all females, who were either pregnant or postpartum at the time of the interviews, depending on whether they completed the program or dropped-out before giving childbirth. In using randomized controlled studies,

Measures

At baseline (i.e., prior to gestational week 25), demographic information was gathered, such as age, due date, number of children, education, occupation and relationship status, and native country. The participants were also asked to fill out several self-report measures to assess depressive symptoms and subjective well-being.

The Edinburgh Postnatal Depression Scale (EPDS) is a 10-item self-report scale that is used to assess depressive symptoms among mothers after childbirth (Cox, Holden, & Sagovsky, 1987). The EPDS is also commonly used to measure depressive symptoms during pregnancy. In this scale, there were 10 items concerning the mental state of the participant in the past seven days. All ten items had different scales related to the question, for example: "*Over the last 7 days, have you felt so unhappy that you had difficulty sleeping?*" (1= "Yes, most of the time", 2 = "Yes, sometimes", 3 = "Not very often" or 4 = "No, not at all").

The Satisfaction with Life Scale (SWLS) is a 5-item self-report scale designed to assess people's overall cognitive judgment of their life. The participant is asked to evaluate what they value most in life. It is not predisposed to assessing satisfaction with life domains such as health and finances, but gives the subject the opportunity to deem these factors as important or unimportant as they see fit (Diener, Emmons, Larsen, & Griffin, 1985). The participants were asked to score items on a scale from 1 to 5 whether they agreed with five different statements about their lives (1= "Completely disagree", 5 = "Completely agree"), for

example: "*My life is in many ways close to my ideal*." Possible scores range from 5 (low satisfaction) to 25 (high satisfaction).

Positive and negative affect scale (PANAS) is a 5-item self-report scale measuring positive and negative affect (Watson, Clark, & Tellegen, 1988). The participants were given 20 different words that describe different moods, 10 of which related to positive affect and 10 of which related to negative affect. The positive words were *interested, excited, strong, enthusiastic, proud, vigilant, inspired, determined, attentive* and *active*. The negative words were *discouraged, upset, guilt, frightened, unfriendly, irritable, shameful, nervous, shaky,* and *afraid*. They were then asked to read every word and mark the extent to which they felt this mood lately, on a 5-item scale (1 = "Not at all", 5 = "A lot").

The Interviews

In the interviews, the focus was on the participants' appraisals of the Mamma Mia intervention, as collected by means of semi-structured interviews. Semi-structured interviews provide increased flexibility and richer data, and are not constricted to any specific or predefined models and prior assumptions about a subject (Smith, 2008). The semi-structured interviews that were conducted in this study consisted of open-ended questions, following the theory-neutral SWOT-framework. The SWOT-format encourages the participants to reflect on strengths (S), weaknesses (W), opportunities (O) and threats (T) (Helms & Nixon, 2010). In this study, the SWOT format was used to elicit participants' open reflections concerning the intervention. The aim was to gain insight in the users experiences and perceptions with the web-based intervention under investigation, to acquire knowledge and understanding of how the program is perceived, and also how it can be improved. This format provides a certain structure to the participant's reflections without specifying a particular type of answers (Lone, Bjørklund, Østerud, Anderssen, Hoff & Bjørkli, 2013).

The structure of the interview had three main parts. These main sections of the interview will later be described as open, exploration, and follow-up. The first part (open) consisted of four questions emphasizing the SWOT dimensions, where the participant is allowed to speak openly with a minimum of interruptions, and no interpretations or probing questions from the interviewer. The questions were "Can you please tell me about what you consider to be the …":

"… strengths and what works well with the Mamma Mia program?"

"… weaknesses and what doesn't work well with the Mamma Mia program?"

"… opportunities to improve the quality of the Mamma Mia program?"

"… threats and challenges with the Mamma Mia program?"

The interviewer was able to help the subject to elaborate, but the first part consisted mainly of allowing participant to speak freely of whatever she felt relevant or important. This ensures that there the interviewer cannot affect the participant's answers or influence the conversation in a certain direction which the interviewer is interested in. This open-ended structure generally results in a wider range of information retrieved.

In the second part (exploration), the interviewer asked probing questions to obtain additional information related to the SWOTs identified in the open part of the interview, such as "You mentioned….", "What do you mean by...?" or "Do I understand you correctly when you say...?" Based on the answers given in part one, the interviewer systematically works through the various SWOTs as identified by the participant, to clarify specific issues. At this stage, the interviewer is more involved. The purpose is to get a more detailed explanation of the information given, and to avoid potential misinterpretations. It also encourages the subject to reflect further on the question at hand.

The final part (follow-up) consisted of four questions regarding appeal, treatment fidelity, marketing and implementation, and giving the participant the opportunity to provide any final or concluding remarks.

The "Mamma Mia" Program

The intervention lasts over a period of 11 ½ months, starting in pregnancy between gestational week 18 to 24, and lasts into the postpartum period, six months after birth. In the pregnancy phase the program is delivered weekly by means of e-mails. After birth, there is a two-week pause before the maternity phase, where the program is delivered three times a week for six weeks. This high intensity emphasizes the vulnerability of this particular time period. After this, the intensity decreases, and the program only arrive sporadically for the remaining weeks. In total, the intervention consists of 44 sessions. Each session is distributed through an email with a hyperlink to the proceeding program session. The program follows a predetermined structure where one session must be completed before proceeding to the next (Haga, et al., 2013).

The program is divided into three different categories, or rooms: "My room", "the baby room", and "the partner room". "My room" focuses on the mother, with information and exercises concerning her emotional stability. "The baby room" focuses on the fetus and baby development, as well as interaction/communication. "The partner room" focuses on the changes and challenges in a relationship during pregnancy and early parenthood (Haga, et al., 2013).

For the assessment of depressive symptoms, the EPDS is administered on three

occasions during pregnancy and four times during the maternity phase in the program, where participants receive feedback based on their scores. In a case where scores indicate a severe depression, participants are recommended to speak to someone and if necessary seek professional help. To help prevent or treat mild symptoms of depression, the EPDS-score is used to tailor a therapeutic component based on metacognitive therapy, where self-evaluation is central, i.e. process of how people arrive at and respond to negative thoughts and feelings. The program also uses mindfulness exercises where the participant can allow thoughts to come and go, acknowledge their presence, but not evaluate them. Furthermore, positive psychology has proven to be effective in increasing life satisfaction, and thus possibly decreasing the risk of depression. The program also contains couples therapy, dedicated to enhance communication between partners and improve relationship satisfaction. Finally, the program also focuses on breastfeeding by providing information about common difficulties, advice, assistance, and other options (Haga, et al., 2013).

Content Analysis

Content analysis is a method for analyzing written, verbal or visual communication or documents (Hayes, 2000), and converting qualitative data into quantifiable units. There are three steps to this process: transcribing, unitizing and coding. The author of this thesis conducted the content analysis.

Transcribing

For transcribing, we employed the O'Transcribe (www.otranscribe.com) web application. The interviews were transcribed verbatim (i.e. word for word), to ensure contextual gravity, executed by the author of this master's thesis. The original transcript was then edited where typical filler words like "uhm" and "hmm" were excluded, as well as insignificant words and sentences like "Let me close the window", or slang phrases like "… if you know what I mean?" All the interviews were transcribed in Norwegian, although one subject was speaking Swedish. All interpretations made by the transcriber were put in brackets. The interpretations included clarifying the context and interpreting blurred speech or interruptions in the audio file, for example: "The idea behind it [the program] is...". These two transcriptions were then saved as two separate files, one with the verbatim transcription, and one edited transcription. The edited version was then used for the coding process (Hannevik, Lone, Bjørklund, Bjørkli & Hoff, 2013).

Unitizing

For the analysis, the transcriptions needed to be broken down into smaller analysis units, a process called unitizing. Unitizing the transcriptions also enables quantification of the

qualitative data. This process involves breaking down the edited transcript into meaningful statements, each unit described as an identifiable message (Neuendorf, 2002). A statement is defined as the smallest meaningful unit that express a logic, consistent and separate point of view. A statement can be whole sentences, part of a sentence, or several sentences, as long as it expresses meaning, and thus being comprehensible by itself (Hoff, Straumsheim, Bjørkli & Bjørklund, 2009).). Units can be words, characters, themes, time periods, actions or other fractions of communication (Neuendorf, 2002). A unit is best defined as: "as large as is meaningful (adding to their validity), and as small as is feasible (adding to their reliability)" (Krippendorff, 2004, s.102). The unit has to be large enough to be meaningful and at the same time convey what the participant wishes to communicate (Hoff, et al., 2009). Generally, a unit is whole entities that the analyst will distinguish between and process as independent elements (Krippendorff, 2004).

Coding

The units were then transferred into the analytic software SPSS Statistics for coding. The units were then coded into four different variables. The interpart-code refers to the section of the interview the unit derives from (1=Open, 2=Exploration, 3=Follow-up and 4=Memo). Further on, the units were coded into the four SWOT components, (1=S, 2=W, 3=O, 4=T) with an added residual value (5=R) for units with no relevance to these four components. Finally, the units were coded according to the PSD framework of Oinas-Kukkonen & Harjumaa (2009) (for codebook, see Appendix). There was only one coding the data. However, participative inquiry was utilized, of which a supervisor reviewed and commented the coding along the way, ensuring reflection, and refinement, thus helping coder to go back and revise (Reason, 1994).

Analyses

To investigate the research questions, two types of analysis of the units were conducted. First, descriptive statistics were performed to describe the data set, such as frequency of units, mean, and standard deviation, and of participant demographics and mental health status. The statistical analysis examined the two frameworks, and the thematic analysis was conducted to assess residuals, and the acceptability of the intervention, as set by the SWOT coding.

Statistical Analysis

In order to examine whether there was a formal, statistical difference between the data explained by the existing variables in the PSD-model and the residuals, a goodness-of-fit chi-square was conducted. We hypothesized that the proportion of units explained by the PSD-model and residuals, respectively, would be approximately 100/0. Further, the distribution

between the four design principles was analyzed. In assessing the PSD model, it is crucial to investigate this distribution of units among the design principles. Exploring how the persuasive systems are being utilized within the program allows us to see whether the program is using the proper persuasive techniques in order to succeed as a health implementation program. We argued that the model should contain an equal distribution of units, i.e. the design principles should account for the same amount of units. Finally, a distribution of units pertaining the SWOT structure was conducted.

Thematic Analysis

In order to gather as much user-experiences as possible for potential further development of the PSD-model, a thematic analysis of the PSD-residuals was conducted. An analysis of the SWOT residuals was also done to assess the SWOT framework. Finally, a thematic analysis was also conducted of the SWOT statements to assess acceptability of the information system. Thematic analysis seeks to identify, analyze and report patterns or themes that arise from qualitative data, and is independent of any theoretical framework. Through organizing and describing the data in rich detail, it allows for complex interpretation and detection of different key aspects of the data (Hayes, 2000). In this study, an inductive approach was used, were the themes ascend from the data, opposed to the deductive approach where the themes are predetermined prior to the analysis, where the analyzer tries to match data to the predetermined themes (Braun & Clarke, 2006). The analytic process was continuous throughout the research process, systematically going back to revise in a nonlinear development to improve analysis. In the analysis, the residuals from the two frameworks the PSD-model and SWOT were investigated in order to determine whether these units contained any relevant information regarding the information system or intervention not captured by the two frameworks. One objective for studying the PSD-model was to investigate whether the residuals could be categorized into themes not captured by the model, and the possibility for further development of the PSD-model in assessing persuasive features in web-based interventions. Further, the SWOT units were analyzed for an assessment of acceptability of the intervention.

Results

Participants

Participants' age ranged from 28 to 41 (mean = 33.5) and all were pregnant with one child. Seven participants had no prior children, one participant had one child, and two participants had two children prior to the current pregnancy. Of all participants, one had a university degree consisting of on to three years, three had a degree of four to five years, and

six had more than a five-year university degree. All of the participants were currently employed, either fulltime, part-time, temporary, or on maternity leave. Fifty percent of the participants were married, and the other 50% had live-in partners. 70% of the participants were native Norwegian, and 30 % were not, originating from Sweden, Denmark and Iceland. All interviews were conducted in Norwegian or Swedish.

Measures

The mean for the EPDS scale was 35,4 (*SD = 2,72*), with possible scores of 10 (high depressive symptoms) or 40 (low depressive symptoms). The threshold score for depression set by the EPDS is 10. Thus, the participants score low on depression, and have few depressive symptoms. Descriptive statistics from the SWLS resulted in a mean total score of 22,9 (*SD = 1,6),* with possible scores from 5 (low satisfaction) to 25 (high satisfaction). These results indicate that the overall satisfaction with life among the participants was fairly high. In the PANAS scale, where the scores may range from 10 (low PA or NA) to 50 (high PA or NA), the descriptive analysis resulted in a Positive Affect mean of 37,9 (*SD = 6,56*), which indicates that the participants scored high on positive affect, feeling these emotions sometimes and quite often. For the Negative Affect, the mean is 14,4 (*SD = 2,28*), which shows a low negative affect.

Interviews

Two interviewers conducted the interviews separately, one of which is the author of this thesis. The interviews were performed during the period of March 17th, 2014 to September 18th, 2014. Five of the interviews were conducted at the Center for Child and Adolescent Mental Health, Eastern and Southern Norway. Two of the interviews were home visits and three were by telephone. The length of the interviews ranged between 30 minutes to 77 minutes (mean = 53 minutes). All interviews were recorded and transcribed electronically.

Content Analysis

The unitizing and coding of the ten transcriptions resulted in a total of 790 statements (mean per participant = 79 units, *SD = 40,33*). Three-hundred and forty units were extracted from the open part of the interview, 260 from exploration and 190 units from the follow-up questions. There were 531 identified SWOTs, and 259 residuals, i.e. units not captured by the SWOT framework. It is worth mentioning that 126 (49%) of the SWOTs residuals derived from the follow-up questions, 47 (18%) were derived from the open part of the interview and 86 (33%) from the exploration part. There were 208 strengths, 114 weaknesses, 170 opportunities and 39 threats, taking into account that some SWOTs may be counted for several times depending on how many times they are stated in the 10 interviews.

Of all 790 statements, 632 (80%) units were coded onto the PSD-model, including residuals. The residuals accounted for 158 (20%) of the units in the PSD-model. The units coded onto the existing variables within design principles, accounted for 575 (73%) of the statements. Units within the four categories in the PSD model are presented in Table 1.

Table 1: PSD Unit Distribution

Design Principle	N	Design Principle	N
Primary Task Support		**Dialogue Support**	
Tunneling	103	Liking	34
Tailoring	83	Reminders	31
Reduction	50	Suggestions	30
Personalization	47	Social Role	16
Rehearsal	24	Similarity	5
Self-Monitoring	1	Praise	0
Simulation	0	Rewards	0
Residual	56	Residual	140
Total	364	Total	256
Credibility Support		**Social Support**	
Surface Credibility	13	Normative Influence	1
3rd Part Endorsement	13	Social Learning	0
Expertise	6	Social Comparison	0
Trustworthiness	5	Social Facilitation	0
Real World Feel	4	Cooperation	0
Authority	0	Competition	0
Verifiability	0	Recognition	0
Residual	36	Residual	3
Total Credibility	77	Total Social	4

Statistical Analysis

To test whether the model explains a significant proportion of the data, we needed to see if the distribution of units explained by the model were significantly different from 0. Ergo the hypothesized distribution is 0% residuals, and 100% data completely explained by the PSD-model, more specifically, the statements regarding the information system. The

results are presented in Table 2, and Table 3.

Table 2: Chi-Square Goodness-of-fit

PSD

	Observed N	Expected N	Residual
158	158	.0	158.0
632	632	790.0	-158.0
Total	790		

Table 3: Test Statistics

PSD

Chi-Square	31599716[a]
df	1
Asymp. Sig.	.000

The chi-square goodness-of-fit indicates a significant difference between the expected distribution of units and the observed distribution. This means that the residuals represent a significant proportion of interview statements that the model did not capture, and our hypothesis of a 0/100 distribution is discarded. Further, the distribution between the design principles within the PSD-model was tested for an equal distribution. The results are presented in Table 4 and 5.

Table 4: Chi-Square Goodness-of-fit PSD Design Principles

PSD Design Principles

	Observed N	Expected N	Residual
Social	4	175.3	-171.3
Credibility	77	175.3	-98.3
Dialogue	256	175.3	80.8

Primary

	364	175.3	188.8
Total	701		

Table 5: Test Statistics

Chi-Square	462.920[a]
df	3
Asymp. Sig.	.000

The results show a significant difference in the distribution of the interview statements, and that there is a skewed distribution of units within the design principles. Finally, the statistical significance of the distribution of SWOTs were analyzed, and presented in Table 6 and 7.

Table 6 Chi-Square Goodness-of-fit SWOT

SWOT

	Observed N	Expected N	Residual
259	259	.0	259.0
531	531	790.0	-259.0
Total	790		

Table 7: Test Statistics

	SWOT
Chi-Square	84912225.141[a]
df	1
Asymp. Sig.	.000

The chi-square goodness-of-fit indicates a significant difference between the expected distribution of SWOTs and the observed distribution. Thus, the residuals represent a

significant proportion that the framework does not capture. The residuals of the SWOTs were assessed in a thematic analysis to reveal if the residuals account for any important factors relevant to the information system.

Thematic Analysis

The thematic analysis of the PSD-model residuals did not result in any new factors that stand out. The residuals contained primarily participant's thoughts and experiences irrelevant to the intervention, such as personal circumstances, prerequisites, and reflections of the pregnancy or how much partner is involved. Many of the residuals contained statements regarding the follow-up questions, such as how they used the intervention, or where they heard about the intervention. Some residuals had relevance to program, such as the type of information given and how this differs from other sources of information (Quote 1), and certain circumstances not restricted to one person but address the general user population (Quote 2).

> "I haven't thought about if there is something missing from the program. There are so many sources for information, it is easy to just google it or ask the midwife" [RespID 118].

> "This is my first child, I think it would be different if I had children prior to this one. Then the pregnancy would be a lot busier than what it has been for me. I've had more time to read up on things, and prepare (…) The program is like a part of a bigger interest for pregnancy and babies (…) " [RespID 118].

It is worth mentioning that one participant constitute 51 (32%) of the residuals, most of which were statements concerning personal experiences of pregnancy. Mean residuals per participant were 15.8 (*SD=12.74*). Hence there are few indications that the model does not substantially capture significant data. There is no foundation to suggest a new factor that can explain data not captured by the model, and contribute to further development of the PSD-model.

SWOT

The thematic analysis of the SWOT units revealed a set of themes consistent throughout the ten interviews, concerning the strengths, weaknesses, opportunities and threats of the information system.

Strengths

Most of the emphasized strengths were consistent across the ten participants. They emphasize accessibility, efficiency, structure, psychoeducational content and professionalism as central strengths. The dissemination of information and user-friendliness of the program

are mentioned among several participants as strengths, in its accessibility, light tone and time-efficiency:

> "For most of the time, I've been at home when I've done the exercises. That worked for me, if not I wouldn't have bothered doing them. They are pleasant exercises. They help you find some peace […]" [RespID 118].

The intervention comes across as thorough, containing brief, relevant information and reminders suitable for the user, and appears structured compared to other sources for information. They also report favoring the program over other websites or sources for information.

> "We receive so much input from all over, so the more information gathered…it feels easy to deal with than that other mess." [RespID 242]

Furthermore, the program seems comforting and preparing, being something the participant looks forward to, and feeling like she is being taken care of and in good hands. Participants also report that the program is normalizing and non-judgmental.

> "… and that mental health is being talked about in a very nice and natural manner. I think that is great, that you can be prepared, knowing that many women go into a postpartum depression afterwards." [RespID 167]

The psychoeducation is also well received. The participant's emphasize the themes containing information about the baby as one of the strengths. The information creates awareness and self-reflection, and contains important reminders facilitating attachment and connecting to the baby.

> "I have a pretty hectic life, and when I sit down with the program, I fully focus on the pregnancy. This is pregnancy number three, so I barely remember what gestational week I'm in. It has just sort of run its course. So that has been okay. I think it has made me pay more attention than I would normally." [RespID 226]

The participants mention ways that the program has helped them in their everyday life, looking at things more positively.

> "It has also reminded me to be present, that's what the audio file highlights. So getting that reminder has helped me be more present when I walk to work, I see the nice things around me, like birds and flowers. I am more attentive now." [RespID 167]

Further, the intervention comes across as professional, but no too clinical, and highly credible. This is partly attributed to the fact that the program is marketed through the hospital.

> "I think it's very okay with a service that is research-based, scientifically grounded, because if you look online into different questions on antenatal and postnatal mental health, it is easy to end up on blogs where it is a lot of opinionating amongst other mothers. That is not very scientifically grounded, you get all these different answers, or you look for answers that you want, adapted to your situation." [RespID 226]

Weaknesses

The weaknesses identified by the ten participants were diverse, but some themes were consistent throughout. The participants emphasized depth of information, relevance, inflexibility, and some technical difficulties as central weaknesses. Although also enlisted among the strengths, the psychoeducation material was perceived as banal and lacking depth, containing information easily retrieved from other sources such as magazines.

"The main criticism is that I haven't learned anything because it's all been banal truisms." [RespID 242]

The lack of depth was especially apparent among the participants with children prior to the current pregnancy, who emphasized that the program only targeted first time mothers, especially young mothers, and were not suitable for multiparous women. Further, the participants mention the fact that the program only targets typical nuclear families.

"We had a different type of pregnancy than people generally have. There were no questions about that in the Mamma Mia program. Is the baby sick, or do you know if you are getting a healthy baby. Our arrangement has been quiet different than those who get healthy babies" [RespID 346]

The participants also expressed dissatisfaction with the tunneled sequence, having to complete one module before getting to the next one. They didn't always have the time to complete the modules in time, thus falling behind and having twice as much to do the upcoming week. This resulted in perceiving the program as a tiresome nuisance, and the information given becomes irrelevant to the current stage when user is lagging behind. Further, some participants mention the inflexibility in the questionnaire, not always finding an appropriate answer, or wanting to report depressive emotion but not being able to.

"[…] you had to answer for the last week if you felt overwhelmed. I thought to my self, I feel pretty tired, that's why things feel overwhelming, but in a manageable way. It's not like I'm about to slip into a depression kind of overwhelming. So it was short-term vs. long-term […] I get why the questions were as generic as they were, but I miss the opportunity to say that's why I answered this." [RespID 213]

This inflexibility is also mentioned in that if user wanted to learn more about something, the different modules are a bit too brief and superficial, with no links or suggestions as to where user can retrieve more information on the subject. Some participants also say that there were some technical difficulties with using the program on smartphones, particularly downloading audio files. Several participants claim that this is reason enough not to do the exercises if it means having to open a computer in order to do them. Further, the exercises towards partner received a somewhat unenthusiastic feedback. Although content was relevant, some participants say that these exercises were hard to put into action, or that the videos were unrealistic, and yet again banal.

> "I feel like it appeals to first time mothers who are in new relationships. And by young I mean that you are almost younger than twenty. I get a teenage-mom feeling, that they recently got together and wonder if they know each other." [RespID 242]

One participant also named a lack of follow-up on the different exercises throughout the program, and resented the one-size-fits-all formula.

> "There is too much approach than challenges, without alternative solutions. No possibility to ask for advise or be directed further it you tried something and it doesn't work." [RespID 242]

Finally some women report the feedback as somewhat impersonal, and unnatural.

> "[…] It is a very impersonal and general feedback. It feels like they care, but at the same time there is no one there. That feeling was a bit strange. I reckon it's because you use it to see how we are doing, or use it for research." [RespID 252]

Opportunities

The participants enlist a number of opportunities for improvement, most of which tackle the weaknesses of the program. These opportunities included suggestions for themes, such as health behavior, pregnancy and the workplace, and necessary safety-equipment, amongst others. Further, the participants express a desire to manage the course of the program themselves, including choosing to go deeper into one subject of interest, or skip one. This could also be resolved adding links to other websites on various subjects, or connecting to a web portal with more information. Further, participants suggest a parallel program dealing with problem-areas concerning difficulties relevant to multiparous women. Some participants also wish that the program facilitated more reflection, particularly self-reflection around subjects such as partner, transitioning into parenthood, and raising a child.

> "I think a program like this designed well can lead to a conversation, a reflection. What do I really think, what do I really mean, how do I live my life? […] Having these thoughts make me self-reflect. Or that my partner and me can clarify certain standpoints. I think a program like this should manage that." [RespID 242]

Including partner and other family-members in what the mother is going through emotionally, is also suggested, especially helping distinguish between postpartum blues and postpartum depression.

Threats

Threats that were named were mostly concerning the timing of the intervention. As the program arrives three times a week for six weeks following birth, the timing is a challenge. Although the timing is appropriate due to the nature of the program, many pregnant women, and especially new mothers, have less time, making it difficult to follow at a weekly basis. This results in lagging behind, contributing to higher attrition.

"Its mostly the risk of not following through that I consider to be the biggest threat. Even though I have been healthy and had excess energy in my pregnancy, I thought it was a bit difficult. All of a sudden there were to-three modules piled up, and if I did struggle mentally and become apathetic, for instance if I had become depressed, then I wouldn't have been able to do it, I think. If I hadn't thought it would really help." [RespID 167]

Further, technical hiccups can further threat continuous use of program, together with the fact that it targets nuclear families, excluding single mothers, unplanned pregnancies or families with a sick baby.

"[…] the ones who don't seek out information, who are unsure if they want to pregnant or not. To them it is more difficult to follow this kind or program where you have to follow up every week, and there is a general positive atmosphere" [RespID 118]

SWOT Residuals

The thematic analysis of the SWOT residuals showed that the residuals were mainly irrelevant to the information system, most belonging to the follow-up questions, such as implementation strategies, how the program was used, lessons learned from the intervention, marketing, or appeal. Further, there were statements regarding personal circumstances and thoughts, or statements concerning the study, and not the program. There were few statements pertaining information regarding strengths, weaknesses, opportunities or threats to the interventions. The statements that did hold some relevance were few and sparse, although some did pertain general reflections concerning the intervention that did not fit into the SWOT coding. Nonetheless, there were not enough consistent statements detected to conclude that the SWOT framework does not capture an adequate and sufficient amount of the data.

"Its whether it's relevant when I read it. It has to be relevant for the whole period" [RespID 242]

Discussion

Summary of findings

The purpose of the study was to examine users' reception and experiences with Mamma Mia, and to identify potential program improvements and factors that could affect program adherence through using the SWOT framework and Persuasive Systems Design framework.

The content analysis and the statistical analyses indicated statistical difference in proportion of units captured by the PSD-model and SWOT-framework, than units not captured (residuals). Thematic analyses of the PSD-residuals and SWOT-residuals did not

show evidence of relevant information not captured by the two frameworks. The content and statistical analysis of the PSD design principles resulted in a skewed distribution of units between the principles, where primary task support contained most units, followed by dialogue support. Credibility support were scarily utilized, as for social support, which contained barely any units. Further, the acceptability of the intervention was measured by thematic analyses of the statements coded under the SWOT. This resulted in consistent strengths, weaknesses, opportunities and threats, describing different qualities of information system features, as described by the participants. The strengths emphasized where accessibility, efficiency, structure, psychoeducation and professionalism. The weaknesses were lack of depth or relevance, inflexibility or technical difficulties for usage. The wish for improvement in themes, a more user-controlled module set-up, and tailoring to multiparous women were among the opportunities mentioned. Finally, the most consistent threat throughout the participants was the timing of intervention.

The Persuasive Systems Design Model

The PSD-model provides insight of the interaction between the information system and its users, whereas the SWOT framework provides insight to the participants' perception of the qualities of information features. Second, the PSD-model help map out of which features are utilized in this particular intervention, providing insight on which features are important in developing successful web-based interventions for mental health, and which features predict adherence. Finally, the SWOT framework is utilized to investigate the acceptability of the intervention amongst its users.

An interesting finding from the results is that the PSD-model covers 80 % of the statements from the interviews, which indicated that the model cover the most central aspects of the information system features. The remaining 20% of the statements, the PSD residuals, were assessed in order to determine whether there were factors relevant to the information system not captured by the model. The results of the thematic analysis revealed that the residuals primarily contained statements irrelevant to the relationship between human and machine, or the context in which they interact. The residuals consisted mainly of statements concerning personal circumstances, individual prerequisites, or reflections concerning themselves and the pregnancy. Some statements did concern the information system, although there were not enough relevant data to be able to successfully form new factors that would include these residuals. Thus, there are aspects of the data that is not covered by the model, but these do not pertain information that could easily be picked up by any other factor than

those already included in the model. This is an important finding, in that there is no need for further development of the two SWOT, as evident by this analysis.

Moreover, statements pertaining to a design principle, but were not coded under any category, were coded as specific design principle residuals. Results from the content analysis showed that primary task support had the lowest number of residuals within its category, whereas over half of the dialogue support was residuals. The high count of residuals implies that there are large aspects of dialogue support that is not fully explained by the model. Further research should investigate these residuals in order to identify which factors are not captured by the design principle. Further research should also address the residuals within each design principle, to assess their properties, and whether there is room for improvements.

The SWOT Framework

The statistical analysis of the SWOTs resulted in a significant difference between expected and observed units explained by the methodological framework. Again, we see that the residuals account for a significant amount of data, and there is possibly relevant data that is not captured by the framework. However, results from the thematic analysis of the SWOT residuals showed that most of the statements were not relevant to the web-intervention. The statements that did concern the intervention were sparse, and could not successfully be put into themes. A substantial amount of the residuals derived from the follow-up section of the interview. This could mean that questions regarding the strengths, weaknesses, opportunities and threats of the web-intervention were widely covered by the SWOT coding, whereas questions concerning treatment fidelity, marketing and appeal were not.

The Information System and its Users

The PSD model enables us to analyze the statements derived from the interviews in order to assess the persuasive system technology, and the interaction between these systems and the users. There were large differences in the distribution of the various design principles in the PSD model. Some categories contained notable large or small numbers of units, suggesting that some principles are more frequently mentioned or emphasized by the participants. Moreover, the mere presence of persuasive features may not be enough to have a successful persuasive information system (Langrial, et al., 2012).

Primary Task Support

Primary task support were the most frequent reported feature, indicating that the intervention successfully provides support for making target tasks easier to attain. The results of this study indicated a skewed distribution of the use of categories for primary task support. The features containing most of the units were tunneling, tailoring and reduction. This is an

indication that the Mamma Mia intervention provides a tunneled guidance through the change process (tunneling), which is a technological result of a modular setup. Most psychoeducation and behavior modification interventions are usually delivered step-wise (Kelders, Kok, Ossebaard, & Gemert-Pinjen, 2012). The intervention also provides customized information at individual level (tailoring), an important feature of effective health behavior change communication (Noar, Benac, & Harris, 2007). Additionally, the intervention makes target behaviors less effortful, such as increasing mindfulness through accessible and applicable exercises (reduction). An interesting finding is that self-monitoring and simulation were not reported frequent features of the intervention. Due to the nature of the intervention, there might not be a need for self-monitoring or simulation, as monitoring steady progress of subjective well-being is less applicable. As such, these features may be more relevant in life-style changing interventions, where monitoring for instance diets or weight loss are crucial.

Primary task ultimately enhances the self-efficacy of the user, and reduces the cognitive load of using an information system, contributing to persuasion towards target change (Torning, Hall, & Oinas-kukkonen, 2009). Information systems supporting users' primary task is desirable for persuasion (Oinas-Kukkonen & Harjumaa, 2009).

Dialogue Support

The dialogue support of a web-intervention is essential because it keeps the users active and motivated (Drozd, et al., 2012). Effective dialogue support is critical in keeping users involved in the information system, and in helping them reach their goals (Langrial, Lehto, Oinas-Kukkonen, Harjumaa, & Karppinen, 2012). The study revealed that the categories most frequently employed are liking, reminders, and suggestions. Reminders are important features contributing to increased adherence (Kelders, et al., 2012). Suggestion is not commonly utilized in health intervention, possibly due to its nature of solving a problem, not suggesting ways to cope with a problem (Kelders et al., 2012).

The participants do not mention features such as praise, rewards, and similarity, which are all considered to be essential persuasive features. (Langrial, et al., 2012). According to Oinas-Kukkonen & Harjumaa (2009), praise and reminders play an especially important role in dialogue support, in addition to appropriate counseling and feedback. Interestingly, the participants of this study do not express a lack of or a need for praise, possibly due to the nature of the intervention concerning mental health, where praise is not as contributing to adherence or motivation, as it would be in for instance life-style interventions.

The results indicate that the Mamma Mia intervention have a positive appeal and general liking, as well as reminding user of target behavior or usage of intervention.

Additionally the intervention provides suggestions for carrying out the target behaviors during the change process.

For further development, the use of praise and rewards could be incorporated as a means to motivate user to continue with the intervention. However, praise as feedback on their behavior should be cautiously pursued, as mental health and well-being should not be something to accomplish as a reward, but rather as a positive outcome.

Credibility Support

The results from the content analysis shows that surface credibility and third-part endorsement were the two most utilized principles, although fairly few units pertained to these two principles. According to the participants, the intervention has a competent look and feel, and is endorsed by other respected sources. In fact, Sillence, Briggs, Harris, and Fishwick (2006) proposed that pleasant visual designs increase the users' perceived credibility in web-based health interventions. Thus, the first visual impression of the information system may affect the perceived credibility of the intervention. The credibility also depends on third party endorsement from respected sources (Oinas-Kukkonen & Harjumaa, 2009). The findings of this study support this, although the design principle is limited in its utilization. The fact that the credibility feature was fairly scarce, and due to the importance of a credible intervention in order for persuasion and behavior change, there is a possible need for improvements. Nonetheless, the fact that the participants do not mention a need for or a lack of credibility indicates that the intervention might be perceived as credible.

Social Support

There was an observed lack of reporting the social support principles, a finding that is expected, given that Mamma Mia does not include any particular system features for social support. Some interventions provide some degree of social feedback or leveraging, however the Mamma Mia intervention does not utilize social support. During the interview, the participants were given open questions on opportunities for improvements of the intervention. Interestingly, the participants neither mention the lack of social support features as positive, or negative, nor do they express a need or requirement for social support features. These results indicate that the intervention should continue being an individual-based program, not linked to social media or other social features that give third parties access to the user's progress within the program. This contradicts the general trend of such consumer information systems, where social support is considered a beneficial factor of behavior-change. This might be due to the nature of the current program concerning mental health; a personal, sensitive and somewhat stigmatized domain. Thus, social leveraging may not be appropriate. Social

support should, however, be facilitated between user and primary family and partners, but limit use of technology-mediated social leveraging. Social support may be more suitable in interventions involving self-monitoring and simulation. More research is needed to investigate whether or not this feature provides any value to web-interventions in mental health.

Acceptability of "Mamma Mia"

The content analysis of the SWOTs shows that the participants emphasized more strengths and opportunities than weaknesses and threats. This indicates an overall positive reception of the intervention. In investigating this, the thematic analysis of the SWOTs gave substantial insight in the participants' experience with the web-based intervention "Mamma Mia", allowing assessment of the acceptability of the intervention. The emphasis on accessibility addresses important barriers for preventing PPD, such as lack of time and excess energy many women experience during pregnancy. The accessibility and availability of a psychoeducational intervention becomes critical. According to the findings, these are contributors to the implementation of the intervention, allowing user to take control over their mental health in the antenatal and postnatal period, suitable to their schedule. The time constraints are also listed in the research as a typical barrier for treatment and prevention of PPD symptoms. Brief and precise information contributes to this accessibility in that it is not too time-consuming and applicable in users everyday life.

According to the results, the intervention initiates important cognitive processes such as awareness and reflection through psychoeducation. The participants consider these to be important contributing factors for increased well-being and attentiveness towards the pregnancy, further facilitating attachment to the baby. Included themes such as partner therapy and being more attentive and understanding in a partner relationship are also highlighted as factors contributing to satisfaction of the information content. The mindfulness approach also contributed to perceived subjective well-being, eliciting awareness of immediate surroundings, and helping user focus attention inwards and onto themselves. Research suggests that it is critical to reduce the stigma attached to PPD, by providing normalizing information (O'Mahen, Woodford, et al., 2013). This may be achieved making the disorder's prevalence particularly, but also it's symptoms, course and consequences publically known. An intervention such as Mamma Mia contributes to this distribution of information deemed crucial in not only reducing depressive symptoms, but also identifying and detecting women at risk.

The participant (RespID 226) quoted on credibility of content also raises an important issue. According to the participant it's a common practice to search for advice online. Because opinions and assumptions are often conceived as truths, this may potentially lead to misinformation. Further, these forums serve as platforms for within-group normalizing, which is found to be reducing confident self-image and further decrease subjective well-being (Haga, Lynne, et al., 2012).

The psychoeducational content was praised among the participants, but several participants also highlighted its lack of depth and banality as a major weakness. Some participants even claimed that an absent opportunity for learning was reason enough to drop out of the program. This is a risk that needs to be addressed for further development of the intervention. This tendency was particularly apparent in multiparous women, who claimed that parts of the content were irrelevant to their situation. According to some participants the program seems to address first-time mothers who have not done basic research, but becomes banal and obvious to multiparous women, possibly resulting in higher attrition among these women. Although research claims that the risk of developing PPD are higher among first time mothers, multiparous women should not be excluded from the target users. The results indicate a need for differentiating between first-time mothers and multiparous women. The multiparous participants stress that these are two different experiences, which calls for a different approach and psychoeducational content in order for these women to benefit from the intervention.

Dissatisfaction with the tunneled sequence was consistent amongst several participants. However, research suggests that tunneled sequence predicts a higher use and adherence to such web-interventions, thus increasing chances of successful persuasion (Crutzen, Cyr, & Vries, 2012). Conversely, Kelders and colleagues found lower adherence in lifestyle interventions that employ a freer setup. This may be due to the scope of these interventions; lifestyle interventions are more oriented towards long-term change, whereas mental health interventions are delivered in short-term and strict format. Thus, health interventions might benefit from a tunneled sequence to ensure adherence.

However, the participants in this study expressed a wish to be given more control of the modules, being able to skip to the next module without having to complete the previous one, the main issue being that the modules easily piled up and became taxing. Lagging behind several modules were reported to result in irrelevant provided information, as the program is tailored to fit according to the stage of pregnancy the user is in. Further, the EPDS-questionnaires were irrelevant as some participants reported that any occurrence of depressive

symptoms had already come and gone. This raises the question as to whether participants found it difficult to participate in the intervention when these depressive symptoms occurred, which led them to lag behind and questionnaires becoming irrelevant. The perceived nuisance also address the issue of whether the intervention is suitable for women with even mild symptoms of PPD. Moreover, participants expressed dissatisfaction with the inflexible answering options in the questionnaires, reporting not always finding answers suitable to their situation or not being able to report what they wanted. This could also be connected to the impersonal feedback some participants mentioned as a weakness, feeling like there is no one there giving personal feedback, or that the questionnaires are only there for gathering data.

Findings from the current study suggest that participants could benefit from being given more freedom in managing the module sequence. Enabling user more freedom to manage course of the program, could also allow them to navigate between modules suitable for their current stage. However, this should be done in caution, as giving too much freedom is related to decreased adherence. By making the program more adaptable for the user, allows them to choose between subjects to immerse in, or address issues on a more personal level. This could be beneficial for the user's well-being, as well as their commitment and satisfaction of the program. If successful, the tailoring to several target groups could diminish the feelings of banality among multiparous users. Targeting a broader group could address the issues related to the couple-therapy videos or other exercises, having several options for different situations and different families. The one-size-fits all formula dissipates, resulting in wider target group, and higher adherence among users. Furthermore the intervention should target users in non-nuclear families, such as single mothers, or families expecting babies with a medical condition. This could also mean detection of a particular risk group for PPD.

The participants did have further wishes for content of psychoeducation, suggesting implementation of healthy habits such as exercise and eating habits. Further, tips on practical matters in pregnancy and maternity such as workplace related issues, and other advice ranging from safety equipment to bodily sensations, warning signs or how to handle a changing body image. Hence, by exploiting the credibility attributed to the intervention, the participants express a desire for more information within the current platform, where scientifically grounded information can help them prepare for motherhood, and prompting subjective well-being. As the timing of the intervention is mentioned as a threat, adding content could be conflicting. However, as suggested, this could be resolved by leaving user in charge of managing the modules, and choosing subjects to immerse in. The threats of timing are

consistent with a lot of the barriers identified with identifying and treating PPD, further confirming that time-efficient interventions are critical.

Further, psychoeducation of partner and immediate family involvement was suggested in order to involve them in some of the processes and transitions of pregnancy and maternity. Facilitating social support is deemed critical in a woman's risk for developing PPD (Haga, Lynne, et al., 2012).

The intervention should aim to reach a wider group of women, including women at risk of developing PPD. These include single women, or families with premature babies, or other infant medical difficulties. Even though multiparous women are at lower risk for PPD, the intervention should further tailor the psychoeducational components to fit their needs. The intervention should serve as a platform for identifying women at risk.

Finally, the program should be adapted for smartphones and tablets, further contributing to accessibility and thus, time-efficiency.

Adherence

Many interventions conducted on the Internet, particularly self-help applications, have high attrition (Eisenbach, 2005), a common issue that needs to be addressed when assessing interaction between human and technology in health-promoting health interventions. This technology is often seen as a mere tool only serving as a means to deliver intervention content (Kelders, et al., 2012). Hence, it is important to investigate specific features that facilitate adherence to these interventions.

Credibility of these psychoeducational interventions is important for continuous use and decreased attrition rates (Jimison, et al., 2005). To secure low attrition rates, it is therefore crucial to have an information system that is convenient, relevant and credible for the target user. Jimison and colleagues (2005) reported that the main barrier for interactive user adherence was the lack of perceived benefit or lack of convenience. This addresses some of the primary barriers to these interventions, especially among the target population of this particular intervention.

The intention to use the intervention is dependent on the perceived unobtrusiveness of the information system. If the user perceives the system as obtrusive, demanding or overwhelming, the user will not form an intention for use (Drozd et al., 2012). The intended usage furthers predict adherence (Kelders, et al., 2012). Thus, the intervention's ability for persuasion and behavior-change benefits greatly if it fits seamlessly into users daily lives (Drozd et al., 2012). In the study, the convenience and accessibility was perceived as favorable, a good indication of intended use. However, support of system credibility features

was underutilized in the intervention. Credibility of the program in the interviews was simply not mentioned. This may be due to that fact that there were no statements expressing a lack of credibility. The participants who did mention credibility of the intervention stated that the intervention was perceived as trustworthy and credible. In this, there might be a bias due to the small sample size and an interview-structure that does not address this subject directly.

Developing web-interventions promoting adherence may benefit from using the PSD-model as a framework for design. As predicted by the PSD-model, the more credibility support employed in a health intervention, the better the adherence (Oinas-Kukkonen & Harjumaa, 2009). This was confirmed by Kelders and colleagues (2012), who measured adherence and persuasive features in a variety of Internet interventions. This is not a surprising finding, as the mental health is a more serious and sensitive domain, and credibility of an intervention is thus more critical for intention of use, as perceived by the user. Primary task support does not affect adherence as much as it affects the outcomes of the intervention, due to the focus on making goals easier to attain, and not so much on the process (Kelder, et al., 2012).

Limitations and future directions

The study has several limitations including sample size, participants, unitizing and coding process, and the utilization of the two frameworks. The sample size and participant demographics has statistical consequences, as results cannot be generalized to a population-level of antenatal women. The ten participants interviewed for the study were typically well-educated, employed women with partners, and the self-report measures indicate that the participants scored low on depressive symptoms, and high on satisfaction with life. This homogenous sample may bias the generalizability of the results. A larger and more diverse sample should be included for future studies, by including women with lower socio-economical status, single mothers, and women with a history of depressive disorders, or current depressive disorders.

The small sample size of this study makes up another bias of the results. When conducting research with a small sample, each individual have a lot of influence on the results. This is evident in the high standard deviation of the mean statements per participants, which implies that there was a varied degree of talkativeness among the participants. This could affect the analyses of residuals, and the importance of particular PSD design principles. One participant might be more positive towards particular factors, and mention these more frequently, whereas another participant may mention factors more concisely and briefly. Furthermore, one participant constituted a substantial amount of the PSD residuals,

decreasing the significance of the initial distribution-findings of statements explained by the model and residuals.

Another limitation of the study involved the unitizing reliability. Since the goal of the unitizing process is to identify and record relatively objective characteristics of messages (Neuendorf, 2002), there is a limitation due to the fact that there is only one researcher conducting the unitizing. This is also evident in the coding process, where intercoder reliability is crucial for the reliability of the coding results. Without an acceptable reliability, these measures can be meaningless (Neuendorf, 2002). To increase the level of reliability and validity of the coding, a second cycle of coding was performed, in order to reevaluate and reanalyze data (Saldaña, 2009). Participative inquiry was also utilized to ensure reflection and refinement, increasing the level of reliability (Reason, 1994). Additionally, the coder followed a codebook for both the SWOT-framework and the PSD-model, which eliminates some of the subjectivity of the analyzer, as opposed to when the coding is done freely. Nevertheless, further research should include inter-judge reliability and more than one researcher coding the data to ensure reproducibility of the unitizing and coding process, and eliminate these shortcomings.

The SWOT framework has been criticized for being too simplistic, by simplifying complex internal and external environment into a short list of manageable issues. The classification of a variable may be challenging, and represents another limitation to the study. The categorization of variables in the four SWOTs may be too dependent on the judgment of the researcher, which may vary (Helms & Nixon, 2010). This may have resulted in some units being incorrectly coded into a category. Using the SWOT interview-structure may also have compromised the results of the persuasive systems features, particularly features such as liking. The SWOT structure encourage participant to reflect on strengths of the intervention, as in what they liked about it. Hence, this might result in a priming of answers set by the interview structure. This may also be biased by the interview structure, and the fact that the questions do not concern these aspects specifically. Therefore, these results must be interpreted with caution as to which features are most utilized. It would be interesting to investigate these features further by using a different framework, or adding to the SWOT framework.

The PSD-model does not account for the fact that statements will mainly concern strengths and weaknesses. Thus, as some of the units may have been coded under weaknesses in the SWOT interview structure, these may represent a lack of a PSD design feature, not a presence of one.

There are limitations to the thematic analysis, where statements are emphasized by frequency, not in value or meaning. This may represent a limit in this study, as the sample size was relatively small, and meaningful information may be lost. In a larger sample size, this quantification of themes is more suitable.

Conclusion

The PSD-model significantly covers the most central aspects of the relationship between human and information system, and the context in which they interact. The aspects not captured by the model did not pertain relevant information that could further be picked up by any other factor than those already included in the model. Similar results of the SWOT framework are evident, where residuals contained little relevance to the system qualities. These findings indicate there is no need for further development of the frameworks, although alterations could be made of the social support, a feature rarely utilized in mental health interventions.

The PSD features provided valuable insight on utilization of persuasive features. The quality of the implementation of the persuasive features is as crucial for the perception of the program. In the intervention, primary task support was the mainly employed principle, followed by dialogue support. Credibility support was sparsely employed, whereas social support was barely used. Out of all the categories, tunneling, tailoring, reduction (primary task support) were the most frequently used features, followed by personalization (primary task support), liking, reminders and suggestion (dialogue support). Primary support is critical for effectiveness of the intervention, whereas dialogue is critical for the motivation and adherence. Credibility support should be further utilized to secure adherence. Social support did not pertain any value in such interventions concerning mental health. Conclusively, the Mamma Mia holds good basis for successful persuasion, adherence, and effectiveness.

The SWOT framework sufficiently investigated the acceptability of the intervention amongst its users. There was an overall satisfaction with the intervention among the participants, particularly emphasizing accessibility as strengths. Such qualities of the intervention address some of the barriers for treatment, supporting web-interventions as a feasible treatment and prevention of depressive symptoms in perinatal women. Potential threats to adherence are timing, and the lack of suitability for non-nuclear families. The intervention may be too strict in its modular set-up to be suitable for women with depressive symptoms, to whom the intervention is originally intended.

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    Mental Health*, *11*(5-6), 377–385. doi:10.1007/s00737-008-0030-9

Appendix: Persuasive Systems Design Codebook
Primary Task Support

0	No	Statement is NOT about primary task support.
1	Reduction	The intervention reduces complex behavior into simple tasks to help users perform the target behavior (ie., primary task such as increase mindfulness, improve parent-child interaction, reduces worrying or depression) and makes performance of target behavior less effortful.
2	Tunneling	The intervention guides its' users through the (change) process and provides means for action that brings users closer to their primary task.
3	Tailoring	The intervention provides information tailored to users' potential needs, interests, personality, usage context, and other relevant factors for certain users or groups of users.
4	Personalization	The intervention offers personalized content and services to its' users.
5	Self-Monitoring	The intervention provides means to track or monitor users' progress, performance or status reports to keep track of the users' goals.
6	Simulation	The intervention provides means for observing the cause-effect link between users' actions or behaviors and their effects.
7	Rehearsal	The intervention enables its' users to practice and rehearse behaviors and other activities which brings users closer to their primary goal.
8	Residual	Any statements pertaining to primary task support which are NOT coded as any of the abovementioned design principles for primary task support (also coded in a separate variable - "PrimaryR").

Dialogue Support

0	No	Statement is NOT about dialogue support.
1	Praise	The intervention praises its' users via words, images, sounds, etc. as a way to provide users with positive feedback and information based on their behaviors and usage of the intervention.
2	Rewards	The intervention provides rewards to give credit for performing a target behavior.
3	Reminders	The intervention reminds users of their target behavior.
4	Suggestions	The intervention suggests users carry out certain behaviors or activities during the (change) process.
5	Similarity	The intervention mimics or imitates its' users in specific ways.
6	Liking	The intervention has an appealing or attractive look-and-feel.
7	Social Role	The intervention adopts an social role.
8	Residual	Any statements pertaining to dialogue support which are NOT coded as any of the abovementioned design principles for dialogue support (also coded in a separate variable - "DialogueR").

Credibility Support

0	No	Statement is NOT about credibility.
1	Trustworthiness	The intervention provides truthful, fair and unbiased information, and does not exploit user data.
2	Expertise	The intervention demonstrates knowledge, experience, and competence.
3	Surface Credibility	The intervention has a competent look-and-feel (eg., by giving a good first impression).
4	Real-World Feel	The intervention provides (correct) information about the organization(s) and/or actual people behind its contents and services.
5	Authority	The intervention refers to people of authority or with a role of authority.
6	3rd-Party Endorsement	The intervention is endorsed by well-known and respected sources.
7	Verifiability	The intervention provides means to verify the accuracy of site content via outside sources.
8	Residual	Any statements pertaining to credibility which are NOT coded as any of the abovementioned design principles for credibility (also coded in a separate variable - "CredibilityR").

Social Support

0	No	Statement is NOT about social support.
1	Social Learning	The intervention provides users with means to observe others who are performing the target behavior and to see the outcomes of their behavior.
2	Social Comparison	The intervention provides means for comparing one's performance with that of other users.
3	Normative Influence	The intervention provides information that influences or leads users to conform to certain behaviors or activities and perform their target behavior.
4	Social Facilitation	The intervention provides means for discerning the presence of other users who are performing the an activity or behavior.
5	Cooperation	The intervention provides means for cooperation with other users.
6	Competition	The intervention provides means for competition with other users.
7	Recognition	The intervention provides public recognition ("anerkjennelse") for users who are performing the target behavior.
8	Residual	Any statements pertaining to social support which are NOT coded as any of the abovementioned design principles for social support (also coded in a separate variable - "SocialR").