

There's an app for that: context, assumptions, possibilities and potential pitfalls in the use of digital technologies to address refugee mental health

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Abstract

The number of refugees is increasing (UNHCR, 2019). The experiences of refugees are linked to impaired mental health yet, this population faces barriers to accessing mental health support (Shannon et al., 2016). Digital mental health interventions are increasingly recognised as an avenue for overcoming these barriers (WHO, 2017). The present paper begins by introducing the area of digital approaches to mental health and developments in this area targeted at refugee populations specifically. We then take a step back to look at the wider picture of refugee mental health and technology. Drawing on Toyama's Law of Amplification (2011; 2015) – that successful technical interventions amplify the intent and the capacity of the people involved - we discuss the importance of context, exploring the assumptions, possibilities and potential pitfalls in the use of digital technologies for addressing refugee mental health. We conclude that by collaborating with refugee populations, placing them at the centre of the design process for digital mental health interventions, we stand the greatest chance of creating the most useful tools.

Introduction

In 2018, the United Nations Refugee Agency (UNHCR) reported that the number of registered refugees in the world had for the first time exceeded 20 million (UNHCR, 2019) with an estimated 16.2 million people newly displaced in 2017. Government figures state that 102,800 refugees were admitted for resettlement during that year (UNHCR, 2019). The experiences of refugees both pre- and post-migration have been linked to impairments in their mental health and well-being (Giacco & Priebe, 2018; Bhugra et al., 2014).

Yet, despite compromises to the mental health of refugees, they rarely access mainstream mental health services (Bartolomei et al., 2016). Barriers to refugees accessing mental health support are illustrated by Shannon et al. (2016). In their examination of characteristics of successful and unsuccessful refugee mental health referrals, factors for unsuccessful referrals included cultural barriers, for example, lack of adequate acknowledgement and consideration for refugees' beliefs about well-being and mental health, and lack of appropriate adaptation of western approaches to refugee mental health and well-being to the refugee's culture. Other barriers included systems barriers and lack of available support, such as long waiting lists or eligibility issues. Language barriers and low use of interpreters were also factors present for unsuccessful referrals. These barriers to refugees' accessing mental health support combined with a lack of understanding of the way in which refugee groups seek help (or lack thereof), a mismatch between needs and

services offered, and difficulties in engagement and trust of mental health services (Vostanis, 2014), comprise substantial and complex obstacles to refugees' access to mental health support.

The present paper introduces the field of digital approaches to mental health support including developments in this area targeted at refugee populations. We then consider the broader picture of refugee mental health and technology. Drawing on Toyama's Law of Amplification (2011; 2015) – that successful technical interventions amplify the intent and the capacity of the people involved - we discuss the importance of context, exploring the assumptions, possibilities and potential pitfalls in the use of digital technologies for addressing refugee mental health. Finally, we propose user-centred design as a way forward to enable the creation of mental health interventions that are appropriate to, useful to, and valued by the refugee populations at which they are targeted.

Digital approaches to mental health support

An area receiving increasing attention for its potential to overcome barriers to addressing refugee mental health is that of digitally delivered self-help approaches. Since the early 2000s there has been a growing recognition of the potential for technology to improve treatment options for mental health (Fiordelli, Diviani & Schulz, 2013). A wide range of technology-based interventions are now available allowing support and treatment for mental health to be delivered remotely, instead of, or in addition to face-to-face interventions (Fairburn & Patel., 2016). There is a growing evidence-base for digital mental health approaches across a range of somatic and mental health disorders, including promising findings when compared to mainstream face-to-face approaches (Carlbring, Andersson, Cuijpers, Riper & Hedman-Lagerlof, 2018). Technology-assisted interventions for mental health vary in level of guidance, from the delivery of mainstream clinician-patient therapies via videoconferencing to self-help in the form of a website or an app administered with little or no guidance.

Technology-assisted approaches have specific potential to overcome barriers to refugees' access to mental health support in a number of ways. Emergency and post-traumatic telepsychiatry can offer access to evidence-based services for geographically underserved and hard-to-reach populations (Augusterfer, Mollica & Lavelle, 2018; Nassan, Frye, Adi & Alarcon, 2015). This is particularly relevant for refugees because of the length of time that many refugees have spent (or are still spending) in war zones or on the move, and because it is increasingly dangerous for humanitarian workers to work with refugees for many reasons, including the criminalisation of providing support to refugees in some countries (Sen, 2016). The flexible access is also important for refugees because of their uncertain immigration status. Digital interventions are praised by the World Health Organisation (WHO) as being more flexible than face-to-face interventions, allowing tailoring to the specific needs and practices of the target audience (WHO, 2017). Further, by reducing the reliance on specialists, the use of technical innovation to deliver interventions, for example, via online and smartphone mediums, can help increase access to support rather than relying on a limited supply of trained professionals whose availability and cost mean they are not an adequate or practical solution to the high prevalence of mental health

issues in refugee and asylum seeker populations. Based on this rationale, digitally delivered self-help approaches offer particular potential for overcoming barriers to refugee mental health support.

Mental health issues prevalent among refugee populations include depression, anxiety and post-traumatic stress disorder (PTSD; Aspinall & Watters, 2010) and as Morina et al. (2018) point out, given the increase in refugee numbers, there is an urgent need for mental health interventions for refugees that can be used on a large scale. The vast prevalence of smartphone use throughout society has led to the increasing development of digital mental health interventions for use on smartphones (Wisniewski et al., 2019). Evidence of the efficacy of such interventions is promising, with successful early results found for interventions targeting both anxiety and depression (Firth et al., 2017ab). For example, Proudfoot et al. (2013) evaluated the efficacy of *myCompass*, a self-guided smartphone and computer psychological treatment designed to reduce mild-to-moderate anxiety, depression and stress. Seven-hundred and twenty community-based volunteers were randomly assigned to the *myCompass* program, an attention control or waitlist condition for 7 weeks. The *myCompass* group showed greater improvements on all outcomes in comparison to both control groups at the end of the intervention phase. Similarly, in a community-based volunteer sample, Parks et al. (2018) evaluated the impact of Happify, a well-being intervention founded in positive psychology, delivered via web and smartphone. A fully automated intervention with no additional support, when used at the recommended level, Happify participants reported fewer and less severe symptoms of depression and anxiety, and greater resilience compared to those using Happify at a low level or those in a psychoeducation condition.

Promising results have also been found for smartphone interventions for PTSD. For example, Kuhn et al. (2017) conducted an RCT of PTSD Coach, a smartphone app developed by the U.S. Department of Veterans Affairs and Department of Defense aimed at individuals presenting PTSD symptoms. Significant improvement in PTSD scores were found after 1 month compared to a waiting list control group, with improvement still present at 3-month follow-up. Similar success was reported by Wang, Wang and Maercker (2013) who examined the efficacy of the Chinese version of My Trauma Recovery (CMTR), a self-guided self-help intervention for PTSD with trauma survivors. They found that CMTR significantly reduced post-traumatic symptoms with a high effect size at 1 month which continued at 3-month follow up.

Following success with other populations, there is a growing interest in the potential for digitisation of mental health approaches with refugees. Developments in the field come from the WHO. They have developed a suite of scalable interventions for refugee mental health and are exploring different ways of utilising technology to further increase the availability and flexibility of these interventions (Sijbrandij et al., 2017). One project exploring the potential for digitisation of a scalable intervention is reported by Tol et al. (2018a) who describe a pilot study of a WHO guided self-help intervention to reduce psychological distress administered to sixty-five South Sudanese refugees in a refugee settlement in Northern Uganda who were experiencing severe psychological distress. Originally created as a response to refugee crisis in Syria, a further, generic version of the intervention was created so that it could be adapted to be appropriate to different socio-

cultural settings. The intervention, Self Help + (SH+) is based on principles of Acceptance and Commitment Therapy, a form of cognitive behavioural therapy (Hayes, Pistorello & Levin, 2012) and consisted of audio recorded sessions and illustrated self-help manual, both translated into Juba Arabic. Delivery of the intervention was facilitated by a lay person and delivered to groups of 20-30. Results revealed decreases in psychological distress and functional impairment, and improvements in depression and well-being.

Self-guided and highly structured in nature, interventions such as SH+ described above are designed to require minimal therapeutic support and so lend themselves to future digitisation. The WHO have a wide body of work underway to develop and test scalable interventions for refugees that utilise digitisation. These include Step-by-Step, an intervention comprising of behavioural activation, problem-solving, stress management, and strengthening social supports and aimed at improving common mental health disorders (i.e. stress, depression, anxiety). This intervention is available as a website and an app and has the option to be delivered in a fully unguided format. An RCT of Step-by-Step is being undertaken in Lebanon with Syrian refugees. Further RCTs are planned for a digital version of Problem Management Plus, an intervention aimed at improved management of psychological and social problems, which will be tested with Syrian refugees in Germany, Sweden and Egypt (see Re-Define Project <http://re-defineproject.eu/>). Their extensive work in the field of digital interventions for refugees and for other populations reflect their belief not only in the increased potential of digital approaches for their adaptability compared to face-to-face alternatives, but in the gains they can bring in accessibility and coverage (WHO, 2017).

As interest in the use of technology to address refugee mental health needs grows, the present paper takes a step back to consider digital solutions in the wider context of refugee mental health. Drawing on current developments and debate we explore some of the assumptions, possibilities and potential pitfalls in the use of digital technologies for improving mental health and well-being with refugee populations. We then highlight key considerations for taking this approach forward to ensure optimal positive impact in this field.

Technology and refugees: the broader picture

The WHO have recently published their recommendations on digital interventions for health system strengthening. Introducing the recommendations, Dr Tedros Adhanom Ghebreyesus, WHO's Director-General states, "digital technologies are not ends in themselves; they are vital tools to promote health, keep the world safe, and serve the vulnerable" (WHO, 2019, p.V). By perceiving technology as a tool, a facilitator rather than an end in itself, those looking to utilise technology to address refugee mental health are faced with a series of challenging questions to uncover what works, for whom and under what circumstances, and, crucially, when technology is and is not an appropriate tool for meeting peoples' needs.

The Law of Amplification

There are many examples of poor design where technology has been put forward as an answer without really understanding the context of the question (see Toyama, 2015). To be valuable and useful, technology as a medium needs to be consistent with the way that the target population use technology, not simply in terms of the devices used but the way that they interact with those devices and for what purposes. Here we can draw lessons from the field of international development in which there is a strong sector for information and communication technology for social change. Within the sector there has been a shift in the framing of technology away from being seen as a solution in and of itself. In his Law of Amplification, Toyama (2011; 2015) describes technology as an amplifier of underlying human forces arguing that technology cannot compensate for human intention and capacity¹, or fix institutional factors. To be successful then, digital interventions need to be in line with the capacity and motivations of the target audience.

Toyama (2011; 2015) identifies 3 mechanisms of amplification, which are outlined below

1. Differential access: Often referred to as the digital divide, globally there is inequality in access to technology and the internet. In 2016, the UN conducted research into digital connectivity among refugees, concluding that refugees were 50 percent less likely than the general population to have access to a phone with internet. Almost one-third had no phone at all (UNHCR, 2016). Differences in access are strongly linked to wealth, with the vast majority of those without internet access living in the least developed countries (International Telecommunication Union: ITU, 2019). While resettled refugees are likely to have access to the internet in their host country, dependent on country of origin, they may or may not have had regular access to the internet before their resettlement. For example, in 2016 the proportion of individuals using the internet in Syria and Somalia, both countries of origin for UK refugees, was 31.87% in Syria compared to 1.88% in Somalia (ITU, 2018). Further, it is often the case that internet access is strong in cities and poor in rural and remote areas (Roberts et al., 2017). This is in line with the UN report on connectivity (UNHCR, 2016), which revealed that 90% of refugees in urban areas have 3G coverage, while among refugees in rural areas only 17% benefitted from 3G coverage, and 20% lived in areas with no connectivity at all. Furthermore, they found that refugees often spend up to a third of their disposable income on connectivity, which sets refugees apart from any other group in terms of relative cost of connectivity.

When considering differential access, as well as, and related to, wealth, there exists a digital gender gap. The ITU (2019) report greater use of the internet by males compared to females with a global internet user gap of 17%. Research conducted in refugee camps in Jordan, Rwanda and Uganda found gender gaps on phone ownership of up to 47% (GSMA, 2019). This gender gap in internet use is increasing year on year with the greatest gaps emerging in the least developed countries (ITU, 2019). Discussing the nature of the digital gender gap, Singh (2017) identifies a range of potential barriers to women accessing the

¹ This paper draws on the Law of Amplification to explore human intention and capacity in respect to refugees' use of technology. For a full account of the Law of Amplification and its different applications, please see Toyama (2011; 2015).

internet including the “leaky pipeline” phenomenon: prioritisation of domestic and family responsibilities over personal development, lack of educational opportunity leading to impaired overall skill, as well as barriers to access, for instance, public computers being located in areas where women and girls do not feel comfortable.

Given the disparities in access, refugees who are experienced in using technology and with using the internet will have greater skills and confidence in this arena and, in turn, are likely to display a greater comfort with and orientation toward technology compared to those who do not have a longstanding familiarity with digital mediums. This brings us to the second mechanism of amplification.

2. Differential capacity: As well as differences in access to technology, Toyama (2011; 2015) identifies variance in the capacity for using technology as a mechanism for amplification. This relates to education levels with better education linked to greater capacity. For example, based on participants’ performance on a set of tasks to be completed on the internet, van Deursen and van Dijk (2010) identified education as an important contributor towards skills with weaker education related to weaker internet skills. Quality of education and level of education achieved by refugees varies greatly between and within countries of origin. An analysis of the education background of refugees applying to seek protection in Germany reported that 45.9% of Syrian applicants had been in education until at least 18, i.e., educated to equivalent of British A-Level or beyond (IW - Institut der Deutschen Wirtschaft, 2018). For Somalian applicants, only 11.4% of applicants had been educated to this level. Education combined with associated factors such as self-confidence and organisational capacities place the educated in a stronger position to utilise technology for their benefit compared to those with a poorer education.

In addition to education, other factors that can influence capacity include age. In van Deursen and van Dijk’s (2010) research into the link between education and internet skills, as described above, a further factor identified as influencing skills was age with older adults demonstrating weaker skills on particular types of operational and formal skills such as navigating the internet using hyperlinks. Older adults are often identified as having poorer digital literacy than younger adults and, in turn, as being less able to benefit from digital interventions. However, work by Hargittai and Dobransky (2017) on the internet skills and uses of digital in older adults suggests a more nuanced picture. Based on an analysis of US national survey data, Hargittai and Dobransky revealed diversity amongst older adults in their internet skills reporting higher internet skills for those with greater wealth and a higher level of education. Further, any age-related skills gap in basic digital literacy may reduce over time as digital natives age into this population.

Further, related to the digital gender gap, lack of use of the internet by women means they have less opportunity to develop digital skills and, in turn may lack confidence in their capacity to use technology. In addition to age, education, and gender, poor language proficiency and literacy in compromising ability to use the internet to seek information or support is a further substantial barrier (e.g., Yu et al., 2010; Lloyd, 2014).

3. Differential motivation: When people have access to technology, what do they want to do with it? Here, Toyama (2011; 2015) acknowledges a common law (and flaw) of human nature – that people are often driven by short term pleasure rather than long term gain. Alongside this he sets out that social structures and poor education combined with the absence of observation and experience of working hard resulting in improved circumstances can mean that the underprivileged may be under exposed to important drivers of motivation. In this context, an intervention that requires time, commitment, and for which any positive impact takes time to manifest, may lose out to other means of user spending time on technology for which the effects are enjoyable and immediate. Varying levels of poverty and education in country of origin along with migration and resettlement experiences are likely to influence the extent to which a refugee is motivated to undertake a digital intervention to improve their mental health.

It is within this already complex picture that we consider how the forced migration experience may make digital interventions more or less effective for refugee audiences. While this paper focuses on considerations for developing digital interventions with refugees, establishing an understanding of what interventions might be effective and for which audiences requires that we acknowledge the differences and inequalities within refugee groups and create interventions which are sensitive to these. As Diefenbach (2018, p.2) states: “If the product does not “speak” to the user in the right way, change is sabotaged before it really started”. If we accept this premise then any digital intervention for refugee mental health must begin with an understanding of how refugees already use technology.

How do resettled refugees already use technology?

Applying Toyama’s (2011; 2015) Law of Amplification to the design of technical approaches to refugee mental health, a necessary pre-requisite to designing interventions is to understand how refugees already use technology. Yet, framing the question in this way is already problematic for it reinforces the flawed assumption that refugees are a homogenous group. Far from it, refugees differ not simply in their country of origin but on multiple dimensions including their religion, education, and where they are on their journey. For example, for refugees looking for a route out of their country of origin, online social networking has been acknowledged as having capacity to transform migration by facilitating the organisation of migration and providing insider and discreet knowledge about the migration process as well as enabling continued contact with family (Dekker & Engbersen, 2014). Once the migration process is complete and refugees are adjusting to life in their receiving country, technology needs will alter. Hence, technical tools and resources are only relevant to some refugees some of the time with needs dependent on a range of varying situational and dispositional factors. There is often a lack of acknowledgment and understanding of the cultural diversity of refugees (Morrice et al., 2019; Robertshaw, Dhese & Jones, 2017). Yet, for designing interventions to address refugee mental health needs, this diversity has huge implications for what is needed, what would be useful, and what is likely to be used. For the purposes of addressing refugee mental health then, practitioners and

developers need to be sure of who their target group are and how this specific group are already using technology in their everyday lives.

While recognition of diversity is vital in tailoring interventions, research into the use of technology by resettled refugees does highlight some common themes: First, technology for practical purposes to help refugees adapt to their new environment, and second, social connectivity, that is, the use of technology to communicate with friends and family.

Facilitating adaption to refugees' new environment

"Despite being a non-human entity, a smartphone is part of the refugees' lives, a virtual lifeline and tool for safety and survival" (Narli, 2018, p.282).

The value of technology for refugees, in particular the use of smartphones, has been widely publicised (e.g. The Independent, 2016; The Economist, 2017). In the 2016 report *Connecting Refugees*, the UN sets out its pledge for all refugees, and communities hosting refugees to have connections to mobile networks and the internet so they can *"leverage these technologies to improve their lives"*. The UN argue that without connectivity the capacity of refugee communities for empowerment is impaired and their pathway to autonomy, compromised (UNHCR, 2016).

Beyond the journey of migration itself, technology, in particular, smartphones, have a key role in facilitating refugees to adapt to everyday living in their receiving country (Alencar, 2018). An in-depth study of smartphone use by Syrian refugees in Turkey conducted by Narli (2018) reported one of the main uses of smartphones was for language acquisition and learning. The other main uses were overcoming structural barriers by accessing and consulting critical information for refugees; and connection to work, education opportunities and social connection.

When discussing differential motivation as a mechanism for amplification, Toyama (2011; 2015) speaks of pleasure as being a short-term outcome often sought through technology at the cost of other more valuable longer-term outcomes. Though the purpose differs greatly to pleasure-seeking, the use of technology to meet urgent practical needs, for example, obtaining information about employment law necessary for seeking employment and earning an income, also falls within a short-term lens. In this way, urgent practical needs may, at least initially, be stronger drivers of refugees' engagement with technology than the need to address their mental health needs.

There is a wide recognition outside of the mental health sector of the potential for technology to support refugees with a growing number of apps specifically designed to facilitate refugees to adapt to their new lives. For example, Akommen (<https://ankommenapp.de/>) is an app designed for refugees arriving in Germany. The app includes a German language learning section, advice on relevant laws such as employment law, and guidance on German culture and values. While apps such as this do not directly target refugee mental health, the impact of such apps on reducing post-migration stress could, in turn, have a valuable impact on refugee well-being. An investigation into the

association between post-migration stressors and refugee mental health was conducted by Schick et al. (2018). In a longitudinal study they examined changes in post-migration living difficulties as a predictor of treatment outcome in a sample of 71 traumatised refugees receiving treatment and social counselling in a specialised outpatient centres in Switzerland. Measures of PTSD, depression and anxiety were taken at baseline and follow-up three years later with post-migration living difficulties measured at both time points. Schick et al. report that reduction in post-migration living difficulties predicted changes in depression and anxiety, but not in post-traumatic stress and conclude that by targeting post-migration stressors relating to social integration such as language and employment, outcomes for refugee depression and anxiety could be improved. While there is some evidence that PTSD can be effectively treated with digital technology (Kuhn et al., 2017, Wang, Wang & Maercker., 2017), Schick et al.'s findings indicate that a reduction in post-migration factors may not be sufficient to treat post-traumatic stress and additional resources may be required.

As suggested above, there has been an increasing recognition of the importance of post-migration stressors on refugee mental health, while research examining the predictors of refugee mental health has traditionally focused on trauma from exposure to experiences in country (e.g. Silove et al., 2007; Ghumman, McCord & Chang, 2016). This difference in emphasis is highlighted by Miller & Rasmussen (2010) who articulate a split between proponents of trauma-focused vs. psychosocial approaches to conceptualising and addressing mental health needs in conflict and post-conflict settings. They emphasise the importance of daily stressors for mental health and propose that these daily stressors play a role in mediating the relationship between war exposure and mental health. Reviewing evidence of the association between post-migration factors and mental health outcomes, Li, Liddell and Nickerson (2016) report that socio-economic, social and interpersonal factors as well as factors around asylum and immigration processes and policy impacted psychological well-being of refugees. Similarly, in a critical review of findings of research on the impact of post-migration factors on mental health disorders in refugees and asylum seekers, Hynie (2018) states that while pre-migration trauma does predict mental health disorders, post-migration factors can be "equally powerful" causal factors for mental health disorders. Further, Hynie argues, these post-migration factors may moderate ability to recover from pre-migration trauma.

The use of technology by refugees to facilitate adaptation to their new environment and the challenges to that adaptation process raise questions about what is needed from digital mental health interventions for refugee populations. For example, whether interventions should focus on trauma or target post-migration stressors, or both, and what sort of digital intervention would be most consistent with the way in which refugees already use technology. Reflecting on refugee and mental health services in the UK, Summerfield (2001) notes that that for the refugee context, approaches to counselling need to acknowledge that practical advice and advocacy is psychologically supportive in itself and that while mental health services should be continually improved, longer-term refugee and asylum seeker outcomes may depend on both their social and their mental worlds. The use of technology by resettled refugees to overcome the challenges they face in everyday life reflects a need and a motivation to reduce pre-migration *and* post-migration stress. By neglecting the importance of post-migration factors on mental health in those interventions

designed to improve refugee mental health means these interventions may not be as effective as they could be. Of course, we are not suggesting that mental health support and other forms of psychosocial support are mutually exclusive - quite the contrary: we would suggest that mental health support could be enhanced by offering other forms of social support.

Maintaining communication with friends and family

In addition to the use of technology for practical purposes of adjustment to their new environment, refugees use technology for forming and maintaining social connections. With a sample of eighteen refugees from Syria, Eritrea and Afghanistan, Alencar (2018) reports that participants used social media such as Facebook, Twitter, Whatsapp and Instagram for an average of seven hours per day. Social media was used to maintain contact with family and friends from home and to engage with individuals or groups within the receiving country. On the one hand, extensive use of social media by refugees may be seen as a positive influence on their mental health. Chen (2010) notes that online social communication can facilitate adaptation to the country of settlement. However, considering the use of technology to improve refugee well-being, the already extensive use of social media and the approach of encouraging greater use of apps and/or the web brings with it a tension. While there is evidence of social media and technology use benefiting social relationships, this runs alongside an increasing concern over problematic smartphone use and the addictiveness of mobile phone apps (van Velthoven, Powell and Powell, 2018) with excessive smartphone use linked to social isolation, loneliness and depression (Darcin et al., 2016; Peper and Harvey, 2018).

Considering motivations for engaging in social networking, the short-term pleasure often provided by using social networking sites corresponds to Toyama's (2011; 2015) Law of Amplification. As described above, Toyama (2011; 2015) observes that people's use of technology is often driven by short-term pleasure rather than long-term gain. Social networking sites such as Facebook are designed to provide enjoyment and provide almost immediate gratification, for example, user posts being 'liked' by fellow users. While enjoyment can be a positive outcome of technology use, for refugees, extensive use of social networking brings with it additional concerns regarding integration. Evidence on refugees' social connections are often presented in the context of Putnam's (2000) terminology of bonding social capital, that is, the connections within homogenous groups, in this case with family and friends at home, and bridging social capital, that is, the connections between individuals from heterogeneous groups, i.e. engaging with groups and individuals in the receiving country (Morrice, 2007; Lancee, 2010, Alencar, 2018). Bridging social capital has been linked with positive mental health with Tip et al. (2019) reporting positive longitudinal effects of intergroup contact with the majority society on refugee well-being (Tip et al., 2019). For refugees arriving in a new country, the challenge of trying to create a new social network, often from scratch, is vast and new social ties can be difficult to establish. Greene (2016) reports that in a sample of 168 refugees from Afghanistan, Iraq, and the Great Lakes Region of Africa, who had within the previous 3 years resettled in Albuquerque, New Mexico, 30% of participants reported having no local social network ties.

The overwhelming nature of the task of forming new ties is likely to make the ease of existing online social networks even more appealing, in turn, compromising their social integration and creation of new social ties. Komito (2011) proposes that while enabling the maintenance of social bonds with family and friends, use of digital social networking may slow down the process of refugees' adaptation and integration into their new country.

The challenge of social isolation

Given the situation that refugees face in a new country, not least barriers to accessing education and employment, it is unsurprising that social isolation has been found to be particularly prevalent in refugee populations. For example, in their examination of the association between post-migration stressors and mental health, Schick et al. (2018) found 'loneliness, boredom or isolation' ranked joint highest post-migration living difficulties stressors along with worries about family back home, with 86% of participants reporting experiencing this at a serious level. Although this reduced at three-year follow up it remained one of the highest-ranking stressors with 73% of participants reporting experiencing this at a serious level. Unemployment is linked to social isolation (Lindsay, 2009) and depression (Howe et al., 2012) and given the barriers refugees face in gaining employment, unemployment is common in this population and the routines associated with employment are lost. Loss of familiar routines of daily living such as those provided by employment or education are associated with impaired well-being (McKee-Ryan et al., 2005). Further, based on interviews with 30 resettled refugees from five countries who had received mental health treatment, Mitscheke et al. (2017) report that refugees feel mental health provision should be delivered in the form of structured group support rather than on an individual basis with refugees experiencing a reduction in feelings of social isolation and a sense of belonging from attending peer facilitated support sessions.

One way to address the tension between offering digital approaches to refugee mental health and the issue of social isolation is to include measures to reduce social isolation and loneliness, key post-migration stressors, in users. There are promising findings on the use of ICT to reduce social isolation. For example, a systematic review by Chen and Schulz (2016) exploring the efficacy of ICT interventions for reducing social isolation for the elderly reported positive effects for reducing social isolation with mixed findings on social support and social connectedness. Further, recent findings by Lindsay et al. (2019) indicate that mindfulness training, the principles of which underlie many of the interventions to reduce psychological distress, can actually reduce loneliness and increase social contact. Lindsay et al. report on an RCT of a two-week mindfulness training intervention delivered via smartphone aimed at reducing loneliness and social isolation in which participants were trained in paying attention to present moment experiences "with an orientation of acceptance". At three days post-intervention, findings revealed a significant reduction in daily life loneliness and an increase in social interactions compared with controls. Lindsay et al. conclude that being equipped with mindfulness skills may dispel feelings of loneliness and stimulate increased engagement with others.

Some mental health apps already being designed and used with refugees do provide some acknowledgement of the importance of social connectedness for refugee well-being, for example, by including a social support component. The WHO's Step-by-Step intervention (Carswell et al., 2018) includes a behavioural activation social support component to encourage refugees to undertake actions that will help build and maintain social connections. Considered in light of Toyama's (2011; 2015) Law of Amplification, the findings regarding extensive use of social networking by refugees indicate that mental health applications that involve a social networking component might be viewed favourably by the target population. However, heavy use of social media may have potential costs to well-being via the fostering of social isolation. By living their social lives online, social integration may be slowed or impaired. There is therefore a responsibility when designing digital mental health interventions to strike a careful balance to ensure that any interventions do not cultivate social isolation or hinder social integration into the refugee's receiving country.

How do refugees seek information and help about their mental health and do they use the internet as a source?

In line with Toyama's (2011; 2015) Law of Amplification, when assessing the suitability of technology-assisted interventions to meet refugee mental health needs, considerations need to go beyond access to technology and technology proficiency. That is, we need to include an exploration of how the technology and the internet fit with refugees' attitudes and expectations about mental health information-seeking and support, and the extent to which digital interventions would be deemed acceptable to the refugee populations at which they are aimed.

Surveys of varying populations, including refugees, support the idea that friends and family are the most common source for information and help-seeking in relation to mental health. Help-seeking from GPs or other specialists is less common (e.g. International Medical Corps, 2017; Oliver et al., 2005). For refugee populations, the disruption and dislocation of family and community networks that is common to the refugee experience requires a reconsideration of sources of information and support. For example, Guruge et al. (2018) explored healthcare needs and use of healthcare services by female Syrian refugees in Toronto. Through focus groups their participants typically reported that health information-seeking had taken place via informal networks of family and friends in Syria and now in Canada they were seeking comparable information sources. Though some participants had used the internet as a resource to seek health information, many were prevented from doing so by poor English fluency and literacy, along with lack of accessibility to computers and the internet, and poor computer literacy. The barrier of poor language proficiency and literacy to using the internet to seek information or support is identified elsewhere (e.g., Yu et al., 2010; Lloyd, 2014). In relation to interventions, lack of familiarity with the terminology used to talk about mental health render the issue of whether a digital intervention is guided, and to what extent, particularly important for refugees. While unguided interventions may provide the greatest potential for low-cost scalability, for

refugee populations an absence of any guidance may make the intervention impenetrable and unusable for some.

The question of whether refugee populations perceive the internet as being able to help them with mental health concerns is part of a wider issue of acceptability, that is, whether a digital medium is deemed acceptable to the refugee populations at which they are aimed. Though there is an absence of a comprehensive review on refugees' attitudes towards digital delivery of mental health interventions, evidence on acceptability of digital mental health interventions with different cultures provides some insights. For example, in a survey study exploring the potential for mobile mental health care for Palestinians in the West Bank, Ben-Zeev et al. (2017) explored mental health needs, technology use, but also interest in and potential engagement with mobile devices for delivery of mental health support. While access to technology and technological infrastructure, for example, reliable internet access, are important, the survey also considered the target population's perception of mental health needs in their community and their own interest in using mobile mental health care. This study showed that interest was great, with the vast majority of participants expressing interest in using a mental health app themselves. Findings in the field of telepsychiatry also provide promising results. For example, Mucic (2008) explored acceptability of telepsychiatry in a sample of refugees, asylum seekers and migrants based in Denmark and Sweden who were receiving mental healthcare via videoconferencing. Notably, the treatment providers spoke the patients' own language. Patients reported a high level of acceptance and satisfaction with telepsychiatry and that any disadvantages were compensated by the doctor and patient sharing the same language and having similar cultural and or national references.

While these results are promising, the factors influencing whether a digital intervention is likely to be used are complex. For instance, Burchert et al. (2019) report on the initial stages of an adaptation process of Step-by-Step, a WHO web-delivered intervention for mental health, into an app for Syrian refugees in Germany, Sweden and Egypt. Participants responded positively to the mental health app, particularly its potential impact on mental health, its customizability, and the ease of learning the materials. However, despite using an extensive process of adaptation to the cultural context and needs of refugees, the researchers still encountered problems with issues around acceptability, credibility, and technical requirements. The adaptation work carried out by Burchert et al. helps illustrate the many factors that those creating interventions for refugee mental health must address if their intervention is to be taken up by their intended users. Further, when attempting to encapsulate the refugee experience we need to ensure that the influence of more basic variables on the appropriateness of a given intervention such as age (Hargittai & Dobransky., 2017) and gender (Tol et al., 2018a) are not overlooked.

While evidence about the acceptability of digital mental health interventions by non-western cultures combined with evidence that some refugees do engage with the internet about physical health issues appear encouraging for the field of refugee digital mental health interventions, their limitations should not be underestimated. Shannon et al. (2015) conclude that we need to provide a wider, more nuanced comprehension of cultural understanding of attitudes to mental health and that this understanding should be reached via gathering the perspectives of refugees themselves as well as providers of mental health

care². When applied to the process of designing digital mental health interventions for refugees, this recommendation advocates for involving refugees in the design process. This includes listening to their perspectives on their mental health needs in order to understand what is needed, but also to gain insights from the target user of the intervention as to what the most pertinent barriers are, and what might be an acceptable way of overcoming these barriers in order to create a usable and useful intervention that users' value. In other words: researchers and practitioners to acknowledge the western lens by which the mental health needs of refugees and ways of meeting those needs are being viewed.

Designing digital interventions for refugees: the importance of user centred design

According to Toyama's (2011; 2015) Law of Amplification successful technical interventions are those that are in line with people's capacities and intentions. For the design of digital interventions for refugee mental health, amplifying what the target population are already doing means creating something that is in line with how refugee populations already use technology and that acknowledges and works with their socio-cultural context including the constraints and barriers that they may encounter. The present paper has highlighted just some of the key contextual factors that need to be understood and accommodated in intervention design and reflected on how these might influence content and approach. Key challenges to and recommendations for designing digital interventions for refugee mental health are summarised in Table 1.

In order to tailor interventions, developers and practitioners need to know what works, for whom, and in what context. In light of Toyama's *mechanisms of amplification* (2011; 2015), considering differential access, we could say that high levels of mobile phone ownership make apps or websites designed for use on mobile phones a good way to reach potential users. However, the digital gender gap means that women may be less likely to own a mobile phone and may not be reached by digital interventions. Further, given the sensitive nature and potential stigma around mental health, where devices are shared between family members, digital approaches may be inappropriate. Focusing on differential capacity, it could be that self-guided digital interventions are more appropriate for use with refugee groups who have experience of using technology and, through regular use, have developed internet skills such as how to navigate websites. For refugees who are not regular internet users and or were not internet users prior to their resettlement, greater facilitation may be required. Finally, considering differential motivation, for a user to engage with a digital intervention at the required level to benefit requires commitment and capacity – if these are not strong then facilitation, such as phone calls to check on progress or creating spaces where the intervention can be accessed in the presence of a facilitator, such as in group sessions (e.g. Tol et al., 2018a), may be required for the digital intervention to reach its potential. With regard to timing we might speculate that for newly arrived refugees,

² While cultural appropriateness is important, this is not an issue for refugee populations alone and is therefore not discussed in depth in this paper. For more information on cultural appropriateness of mental health support, we refer to the substantial body of literature addressing culturally competent care (e.g., Gambrill, 2014; Mills & Fernando, 2014; Sen, 2016; White & Sashidaran, 2017).

Table 1: Challenges and recommendations for designing digital interventions for refugee mental health.

Challenges and Opportunities	Ideas and recommendations for action
<p>Post-migration stress can be of equal importance to pre-migration factors in impacting refugee wellbeing and reductions in post-migration stress are linked to improved wellbeing.</p>	<p>If an intervention is looking to reduce common mental health disorders (rather than targeting PTSD) then addressing post-migration factors is crucial. This could be achieved as a central component of the intervention or through a combination with complementary resources in which post-migration factors can be targeted alongside direct mental health provision.</p>
<p>Social isolation and excessive smartphone use are risk factors for refugee wellbeing.</p>	<p>Interventions can be designed to include measures to reduce social isolation such as helping to identify and/or create opportunities for refugees to engage with as individuals from the receiving country as well as other members of the refugee community facilitating bridging social capital as well as bonding social capital.</p>
<p>Stigma about mental health is a commonly identified barrier to refugees discussing their mental health and seeking mental health support.</p>	<p>Exploring the perspectives of target refugee communities on their mental health needs will generate insights about what is needed, but also what the most pertinent barriers are, and what might be an acceptable way of overcoming these barriers in order to create a usable and useful intervention that users' value. These insights can be achieved by involving refugees for the target population in intervention design from the early stages of the process.</p>
<p>Cultural definitions and interpretations of mental health can vary greatly between and within different refugee communities, and these variations determine ways in which people speak about their problems, and which solutions they might consider acceptable for those problems.</p>	<p>There is a responsibility for developers, researchers and practitioners to acknowledge the western lens by which the mental health needs of refugees and ways of meeting those needs are being viewed. Framing mental health in a way that is consistent with the way refugee populations conceptualise their mental health increases the chances of success of a digital intervention for having a positive influence on refugee health and wellbeing.</p>
<p>Refugees are not a homogeneous group and the social and cultural contexts in which refugees exist differ greatly between different refugee communities.</p>	<p>Engaging in user-centred design placing the target refugee population at the centre of the design process will enable an understanding of user characteristics and needs, as well as the challenges those users face. With this in-depth understanding, interventions can be tailored to fit the specific context maximising the chances of any intervention being useful and used.</p>

digital interventions that facilitate their understanding of and adjustment to life in their receiving country may be more enticing than those that focus purely on mental health. It is possible that interventions directly addressing mental health may be of greater appeal to refugees once their new life is more familiar and day-to-day life becomes easier or at least more predictable. However, this speculation is inadequate to the task: what is needed is substantive research with specific refugee groups to generate a detailed evidence-base in which appropriate interventions can be grounded. This research should not investigate the effects of each of the above factors in isolation: their combined impact also warrants empirical analysis.

One way to tailor interventions to the intended user group is to start with a generalised intervention and make adaptations to this intervention to make it suitable and relevant for different groups creating multiple versions of the same intervention (e.g. Spanhel et al., 2019). For example, in the WHO's Step-by-Step intervention, a story-based intervention aimed at reducing psychological distress, the character providing guidance can be exchanged to depict a trusted community member for the target community, for instance, an elder or a health professional (Carswell et al., 2018). An alternative approach is to begin with the particular population the intervention is aimed toward and working with them to establish how they conceptualise mental health and what they need to support their mental health needs. This kind of "user-centred design" may help to maximise the meaning of digital tools for refugee communities.

Key characteristics of user-centred design are that it is guided by the user's goals, tasks and needs, and it comprises active participation of intended users in the design process from the early stages (Gulliksen et al., 2003). Methods for engaging potential users can include focus groups and other face-to-face engagement with refugees to establish their needs and priorities, the way they engage with technology, what they see as the 'problem', and reflections on and attitudes toward possible solutions. User centred design also involves engagement with a broad range of stakeholders to gain an understanding of the issue and context. This might include those who work with the refugee population closely such as gateway workers, local council as well as those already providing mental health and well-being support to the population. Drawing on their knowledge and experience these stakeholders can reflect on the emergent themes helping to create a cohesive picture. The process can be optimised by the employment of peer-researchers. Compared to professional researchers who may be viewed by refugees as 'outsiders' (Minkler, 2004) peer researchers can provide access to hard-to-reach populations and an alternative lens by which to define problems and ask questions. Used successfully in research with refugees in the UK by Collyer et al. (2017), the employment of refugees to undertake research helps provide opportunities for refugees and reduces the risk of refugees feeling exploited by their participation in research as well as adding integrity to the process.

Working collaboratively with refugees and practitioners, with researchers and designers, user-centred design allows the co-construction of possible solutions which can be tested and modified in an iterative approach. Further, a tool developed with the user at the centre of the design process and stakeholder engagement from the outset will establish clear pathways to uptake of that tool increasing the chance that it will be useful and used.

Recognised as good practice for digital and non-digital interventions (e.g., Burchert et al. 2018; Marent, Henwood & Darking, 2018), examples of user-centred approaches for the design of digital tools including detailed accounts of steps taken can be found in Schnall et al. (2016) and Hardy et al. (2018).

Conclusion

The present paper has highlighted just some of the key contextual factors that need to be understood and accommodated when designing mental health interventions for refugees. According to Toyama's (2011; 2015) Law of Amplification, successful technical interventions are those that are in line with people's capacities and intentions. To achieve this, interventions need to be designed to align with how refugee populations already use technology. They also need to acknowledge and work with the social-cultural context of refugee populations including the constraints and barriers that these populations may encounter.

Despite the challenges, there is promise for digital intervention to help address refugee mental health needs. By collaborating with refugee populations to co-construct possible solutions we stand a greater chance of creating the most useful tools to support refugee mental health. A user-centred process requires that we listen to criticism of digital approaches, accept the limitations of digital, and are open to alternative approaches. This openness incorporates a willingness to learn from different cultures in terms of modes of understanding of mental health and its treatment. By being open and collaborative and working with refugees to help understand and meet their needs, whether through digital means or otherwise, we place ourselves in the optimal position for supporting the mental health of refugee populations.

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