

Co-designing services with vulnerable consumers

1. Introduction

Reducing alcohol consumption among adolescents is one of the foremost challenges for society given evidence that higher-level alcohol consumption continues into adulthood and may have significant physical, mental and social consequences (McCambridge *et al.*, 2011). Adolescents have been shown to be particularly vulnerable to alcohol advertising and messages (Siqueira *et al.*, 2015) owing to rapid changes in their brain development (Randolph *et al.*, 2013). Services, particularly alcohol education, are important to challenge and counteract the positive messages surrounding alcohol consumption in society (McBride *et al.*, 2004; Szmigin *et al.*, 2011; Rundle-Thiele *et al.*, 2013). There remains scope to improve alcohol education as effectiveness of programs varies (Foxcroft and Tsertsvadze, 2012a; Onrust *et al.*, 2016). Transformative service research (TSR), which aims to improve the wellbeing of consumers and communities through service (Ostrom *et al.*, 2010), offers an avenue for achieving this goal. Although all services have the potential to be transformative in that they have the capacity to improve consumer wellbeing, some services such as education and health services explicitly aim to do so and are of particular interest in TSR (Anderson *et al.*, 2013; Guo *et al.*, 2013; Rosenbaum *et al.*, 2011).

The majority of school-based alcohol education tends to be expert-driven in design, with little or no involvement of the primary service beneficiaries – adolescents (Dietrich *et al.*, 2016). Such a top-down design approach has been criticized as it does not consider the specific needs and requirements of service users (Lundkvist and Yakhlef, 2004; Witell *et al.*, 2011), nor recognize that users actively co-create service experiences (McColl-Kennedy *et al.*, 2012; Osei-Frimpong *et al.*, 2015). Active involvement of users in design and development processes addresses this criticism (Edvardsson *et al.*, 2012; Steen *et al.*, 2011). While user involvement in service innovation is gaining acceptance, the practice remains in its infancy (Hoyer *et al.*, 2010; Gemser and Perks, 2015). Edvardsson *et al.* (2013) note that conventional market research techniques such as interviews, surveys and focus groups remain the dominant means of consumer insight generation for the design process. The slower than expected move toward more active methods of user involvement may be attributable to time and cost intensive processes needed to identify qualified users who are willing and able to contribute to innovative ideas that address the needs of the broader marketplace (e.g. Piller and Walcher, 2006; Poetz and Schreier, 2012).

One specific form of active user involvement is co-design, an approach that facilitates a collaborative design process between designers and users with the aim to involve users as “experts of their experiences” (Sanders and Stappers, 2008, p.6). Steen *et al.* (2011, p.53) propose that co-design is essentially about “helping the users to articulate...precisely and realistically which benefits to aim for and to match these benefits to the goals of a service design project”. In this way, service users can

provide insights into their needs and contribute to new ideas that transcend information sourced from traditional market research techniques (Lundkvist and Yakhlef, 2004; Witell *et al.*, 2011) and expert views dominating contemporary practice (Holmlid, 2009; Krippendorff, 2006). Yet, limited research is available that examines how users can be involved in co-design or how their involvement might affect design outcomes. This has led to the recent call for exploration of new approaches to service design, with a focus on investigating participatory or co-design processes, to enhance service user experience and reduce the chances of costly new service failures (Ostrom *et al.*, 2015). In particular, “designing services for vulnerable consumers” has been identified as a key priority to advance and benefit the service field (Ostrom *et al.*, 2015, p.140). Hence, additional research in co-design is needed in new areas of application such as transformative design (Sangiorgi and Junginger, 2015). This research contributes to addressing these calls by investigating how vulnerable consumers can be involved in transformative service design and how this approach may enhance the design of such services. More specifically, we pose the following research question: “*How can vulnerable consumers be involved in transformative service design?*”

This research contributes to knowledge in TSR – a priority in service research (Anderson *et al.*, 2013; Wunderlich *et al.*, 2013) – and service design by extending the boundaries of our understanding of processes and tools for the involvement of vulnerable consumers in transformative service design as called for by the literature (Ostrom *et al.*, 2015). The research examines and reports on the involvement of vulnerable consumers in the design process of a specific transformative service - an alcohol education program targeted at adolescents. By engaging in a co-design process with vulnerable consumers, researchers were able to articulate theoretically and practically how co-design with vulnerable consumers differs from existing user involvement processes. As a result, a six-step co-design framework is proposed including: resourcing, planning, recruiting, sensitizing, facilitation, and evaluation of outcomes. For practice, the framework outlines how co-design might be applied so that vulnerable consumers can become empowered participants during the service design process. Overall, this study contributes to the contemporary topic of addressing “societal concerns and value in the service environment” by examining co-design as a possible approach to enhance “mindful service experiences that are beneficial to the recipients, to those around them, as well as to the environment” (Ranaweera and Sigala, 2015, p.6).

2. Literature review

Transformative service research

Enhancing the wellbeing of vulnerable consumers through service design, provision and outcomes has been identified as a core focus for TSR (Rosenbaum, 2015). Vulnerable consumers are those whose individual characteristics (e.g. age) or individual states (e.g. cognitive or physical capacity) interact with external conditions (the environment) to create a state of powerlessness in consumption situations

(Baker *et al.*, 2005). From this perspective, consumer vulnerability is contextual and can be transient. For example, in the case of adolescents, their still-developing cognitive capacity (Piaget, 1952) interacts with the prevalence of alcohol advertising (Siqueira *et al.*, 2015) and the pervasiveness of “a culture of intoxication” (Fry, 2010) to create a state of powerlessness in alcohol consumption situations resulting in the average age of initiation being just over 15 years (AIHW, 2014). Vulnerable consumers may have difficulty defining their goals and preferences while simultaneously possessing fewer resources to achieve those goals and preferences (Ringold, 2005). Previous studies in TSR have examined vulnerable consumers’ adoption of transformative services (Schuster *et al.*, 2013, 2015) and service outcomes in these populations (Rosenbaum *et al.*, 2014; Rosenbaum *et al.*, 2011).

Despite the call for research to investigate the design of services for vulnerable consumers in TSR, little research has focused on understanding how vulnerable consumers can be involved in and contribute to service design. This may be attributable, at least in part, to the fact that vulnerable consumers are generally treated in the way that well-meaning others think they should be treated (Baker *et al.*, 2005), perhaps contributing to the dominance of expert-driven transformative services, such as alcohol education, where researchers and practitioners often design services they think should benefit vulnerable consumers. Donetto *et al.* (2015, p. 241) highlight the difficulty of “equality, equal contribution and mutual respect” in healthcare contexts, where “traditional roles of provider and recipient of care are clearly demarcated”. The benefits of an inclusive approach to transformative service design are highlighted in the study by Engström and Elg (2015), which shows an improved sense of relatedness for lung cancer patients as a result of participation in service design. Corus and Saatcioglu (2015) propose an intersectionality conceptual framework for designing services for consumer groups with multiplicative vulnerabilities (e.g. age and race). While the framework is operationalized at a strategic level, which outlines broad principles for fostering inclusion, it does not provide insights at a tactical level, which outlines practically how vulnerable consumers can be included in service design as is the aim of this study.

Service design

Service design can be best understood as a creative, human-centered and iterative approach to service innovation (Wetter-Edman *et al.*, 2014), and can be defined as a “... systems challenge driven by an understanding of human experience” (Evenson, 2008, p.26). Two concepts underpin service design. First, as a systems challenge, service design concerns the design of service systems, which are value co-creation configurations of people, technologies and additional resources that interact with other service systems to co-create value (Maglio and Spohrer, 2008). The challenge is to design service systems that support value co-creation and resource integration among multiple actors (Pinho *et al.*, 2014). Second, service design takes a human-centered design approach, as it follows an “outside-in perspective” to investigate and understand how consumers experience a service (Holmlid, 2007;

Holmlid and Evenson, 2008). Human-centered design aligns with the phenomenological value perspective of S-D logic (Vargo and Lusch, 2008), which proposes that design has no significant meaning unless it becomes part of the living experience of people and sustains them in the performance of their own actions and experiences (Krippendorff, 2006). The design of a service thus starts with an understanding of users' experiences, value co-creation activities and interactions, and the subsequent service system design in the form of a supporting configuration of resources (i.e. value proposition) for users to integrate and operate on (Edvardsson *et al.*, 2012; Patrício *et al.*, 2011).

Service design has also been investigated for its transformative role (Sangiorgi, 2011). In this context, "design for service" was introduced, suggesting services not as design objects but as means to support the emergence of a more collaborative, sustainable and creative society and economy (Kimbell, 2011; Meroni and Sangiorgi, 2011). This approach required changes to the traditional model of service production and delivery, which are also fundamental to S-D logic: from the focus on discrete transactions of outputs and the definition of users as passive recipients of value, towards defining users as active participants in the creation of wellbeing and value (Bentley and Wilsdon, 2003; Cornwall, 2008). This shift has led to a focus on exploring collaborative service models including co-creation with service users (Cottam and Leadbeater, 2004; Mele *et al.*, 2014).

User involvement and co-design

Collaboration with users during design processes is considered vital as users possess specific needs and problems and thus can contribute valuable knowledge to addressing these needs and problems (Holmlid, 2009). This position draws on the participatory design theory principle that "it is possible to gain access to the experiencer's world only through his or her participation in expressing that experience" (Sanders and Dandavate, 1999, p. 90). As design theory has evolved toward human-centered design, Krippendorff (2011, p. 413) even suggests that "users often are better designers of their own worlds than professionals", implying that "the point of professional design lies not in insisting on being experts but in enabling others to design their own world". The importance of user involvement is also acknowledged in innovation and new service development research (Alam, 2002; Hoyer *et al.*, 2010). Studies show that user-generated ideas can increase user benefits (Kristensson *et al.*, 2004; Magnusson *et al.*, 2003), be highly innovative (Magnusson, 2009; Poetz and Schreier, 2012) and enhance consumers' perceptions of a firm's ability to innovate (Schreier *et al.*, 2012). It should be noted that these studies focus on involving users who have the willingness and capabilities to contribute to innovation activities such as 'lead users', 'emergent consumers' or 'market mavens' (von Hippel 2001; Piller and Walcher, 2006; Hoyer *et al.*, 2010). This is, however, problematic in transformative service design for vulnerable consumers who may not have the willingness or capabilities to take part in innovation activities.

Co-design focuses on those who are directly affected by a design (Mattelmäki and Visser, 2011). Users are ‘co-designers’, meaning that designers and participants not trained in design collaborate throughout the whole span of a design process with the aim of achieving collective creativity (Sanders and Stappers, 2008). A core principle of co-design is that the involved users or other stakeholders are empowered to contribute to the design process and that their experience and expertise is valued (Mattelmäki, 2008). In fact, Mattelmäki and Visser (2011) suggest that key to participatory design approaches is empowerment, which means that the ones who are affected by the design should also have an opportunity to influence it. This proposition is key to this research as it supports Baker *et al.*'s (2005) argument that consumer empowerment is vital in both market and policy responses to consumer vulnerability.

User involvement predominantly concerns users taking over innovation or design activities traditionally executed by the firm (Fuchs and Schreier, 2011). Thereby firms ‘democratize’ innovation by equipping users with appropriate toolkits to allow them to independently undertake needs-related innovation activities (von Hippel, 2001; 2005; Franke *et al.*, 2006; Boudreau and Lakhani, 2013). In contrast, the purpose of co-design is to facilitate the “exchange between people who experience products, interfaces, systems and spaces and people who design for experiencing” (Sanders and Dandavate, 1999, p. 90). In order to facilitate this exchange, considerations across the design space (Sanders and Westerlund, 2011), design process planning and facilitation (Visser *et al.*, 2005; Donetto *et al.*, 2015), the roles taken by designers (Manzini and Rizzo, 2011; Mattelmäki and Visser, 2011), and applied design tools and methods (Sanders *et al.*, 2010) are required. For example, both Visser *et al.* (2005) and Steen *et al.* (2011) emphasize the importance of the planning and preparation phase which includes the formulation of design goals, the selection of participants as well as the sensitizing of users in order to increase their familiarity with the underlying design task. Similarly, Donetto *et al.* (2015) suggest that extensive preparation time is required prior the actual co-design event, specifically in terms of gathering user insights and experiences through observational fieldwork.

During the actual co-design process, Manzini and Rizzo (2011) propose that designers need to change their roles in order to encourage user participation during the co-design process and to trigger ongoing design initiatives beyond the actual design process. Design tools are a key aspect of empowering users and facilitating collaboration during the co-design process (Mattelmäki and Visser, 2011). Forms of facilitation can involve ‘giving voice’ to users by providing them with appropriate design tools or designers actively participating as co-designers during the process (Mattelmäki and Visser, 2011). Such design tools – also described as “tools for conversation” – are essentially built upon a collaboration-based mindset and aim to facilitate conversation about the given design content (Mattelmäki and Visser, 2011). In their application, design tools can be very diverse, ranging from simple and traditional communication tools (e.g. posters, slideshows) to more sophisticated and original ones (e.g. videos, possibility cards, interactive media, competitions). For example, Brandt *et al.* (2008)

used board game-style rules, involving a game board, playing cards and turn-taking, to encourage collaboration, co-discovery and the creation of new and shared design representations amongst participants. Mattelmäki (2008) proposes design probes as a method that allows users to reflect on and communicate their experiences. This method can thus be effective not only for collecting user data but also to encourage collaborative exploration amongst co-design participants. Clatworthy (2011) shows that cards can assist cross-functional teams in innovation and can also assist to build team cohesiveness during the first phases of the new service development process. The card sorting activity is a method that has been widely employed in different research contexts such as psychology and psychiatry (Pazart *et al.*, 2011), knowledge and software engineering (Palmer *et al.*, 1988) as well as website optimization (Upchurch *et al.*, 2001). In these contexts the card sorting method has been suggested as a useful elicitation tool for a number of outcomes, such as testing users' recall knowledge, distinguishing between likes and dislikes, and providing insight and input for further analysis. It can achieve these outcomes while still providing a flexible, easy to administer tool for researchers, which is simple for participants to engage with (Nurmuliani *et al.*, 2004; Upchurch *et al.*, 2001; Zimmerman and Akerelrea, 2002). The present study extends on these studies by investigating the application of the card sorting activity as a possible tool to empower and engage vulnerable consumers in the co-design process.

Despite the emerging literature investigating co-design, including its approach and the development and application of suitable design tools, knowledge within this field is still nascent. Following from the examination of the co-design literature, it is apparent that there is currently no comprehensive framework available that specifies how vulnerable consumers might be involved as active and empowered participants during the service design process (cf. Ostrom *et al.*, 2015). In their review of the concepts of co-design and co-creation from a design research perspective, Mattelmäki and Visser (2011), and more recently Donetto *et al.* (2015), concluded that co-design can be approached differently in terms of the time span of the engagement and the phases of its process. In addition, the innovation and new service development literature provides generic frameworks for active user involvement although the focus is primarily on innovative users (Hoyer *et al.*, 2010) or business-to-business customers (Alam, 2002). These frameworks do not accommodate the unique characteristics of vulnerable consumer groups that may influence the efficacy of such processes. Vulnerable consumer groups are often marginalized by society and may experience a sense of powerlessness (Baker *et al.*, 2005) that reduces their motivation to contribute to co-design activities. In addition, inherent individual characteristics that underpin consumer vulnerability (e.g. age and cognitive capacity) may further impact their ability to contribute to co-design. Previous research supports the proposition that not all consumers possess equal capacity to contribute to co-design (e.g. Donetto *et al.*, 2015; Engström and Elg, 2015). This highlights the need for research that examines specifically the co-design process for vulnerable consumer groups, and identifies the differences with existing user involvement processes.

3. Method

Context and structure of field study

School-based alcohol education is a particularly fruitful context for exploring and analyzing the process for including vulnerable consumers in service design. Although school-based alcohol education programs aim to enhance adolescents' wellbeing, through knowledge transfer and subsequent creation of opportunity or ability to reject or modify alcohol consumption behaviors, these services also have the potential to negatively affect adolescents' identity, particularly if they are already drinking alcohol. This possibility, together with adolescents' inherent vulnerability given their age (i.e. brain development) (Siqueira *et al.* 2015), make it particularly important that they are involved in the service design process. Further, this context is also interesting from the perspective of co-design, as health service exchanges are known for barriers to consumer-provider collaboration, such as power distance (Berry and Bendapudi, 2007; Donetto *et al.*, 2015).

A case study approach (Merriam, 1998) was employed, with six high schools in Australia identified as sites to conduct co-design sessions for a school-based alcohol education program. This case study approach allows a) the phenomenon to be studied in its natural setting, b) the research question to be answered in a way that acknowledges the complexity and dynamic nature of the phenomenon studied, and c) an exploratory investigation of a phenomenon that is not well understood (Voss *et al.*, 2002). The present research followed a literal replication logic thus selecting cases that predict similar results (Voss *et al.*, 2002). The schools were sourced from a larger cluster randomized controlled trial of a school-based alcohol education program named GOKA (Rundle-Thiele *et al.*, 2013; 2015). GOKA is an expert-designed program and features interactive lessons using online games and practical activities to enhance adolescents' learning experiences whilst reducing positive attitudes and intentions towards binge drinking (Rundle-Thiele *et al.*, 2013; 2015). The GOKA program was delivered in 14 schools and lasted for a full-day (six modules) at each school. The participation in this one-day program was voluntary for all adolescents. More details of GOKA are available in (Rundle-Thiele *et al.*, 2013; 2015).

One to 14 weeks after the delivery of the full-day GOKA program, co-design sessions involving 58 adolescents were facilitated. Different to the full-day program, the co-design sessions were conducted with a maximum of ten participants. Groups of more than five members can be beneficial for creating a group feeling and encouraging group discussions, but keeping groups small is also important to be able to pay attention to every individual (Visser *et al.*, 2005). All co-design sessions took place at the respective schools in different rooms, including a boardroom, meeting rooms or class rooms. The co-design sessions were tape-recorded and transcribed. In addition, field notes were taken by the principal researcher after the co-design facilitation. The collected data were analyzed using NVivo Version 10 and data were coded using thematic analysis, where the researchers allowed themes to emerge from the data (Thomas, 2006).

GOKA program delivery and user sensitizing

The full-day program consisted of six lessons featuring online games and practical activities. Adolescents were asked to provide feedback in regards to the design, content and usefulness of the individual games and activities through online surveys. Service users' mean age was 14.7 years with 54% being male. The GOKA program was designed to be highly interactive and adolescent-oriented through the online gaming components and practical activities, such as wearing beer goggles, "passing out" and a "stork balance" activity.

The full-day GOKA program "sensitized" the users to the topic prior to the co-design sessions. The basic principle of sensitizing is to let people express and reflect on memories, opinions, dreams, and past experiences around a specific topic and, as such, it increases their familiarity with the topic (Visser *et al.*, 2005). In the current study adolescents were engaged in, and reflected on through a survey, the existing GOKA program and its individual activities for an entire school day. In addition, as the lead researcher was involved in delivering the GOKA program and the subsequent co-design sessions the sensitizing stage also created an opportunity to build familiarity and trust between the facilitator and potential co-design participants.

Recruitment for the co-design session

The recruitment of adolescents for the co-design sessions was conducted by 10th grade (14-16 year-old adolescents) coordinators, pastoral care coordinators, as well as health and physical education teachers. These contacts were established through the GOKA program delivery and allowed for a more streamlined recruitment process. Participation in the co-design sessions was voluntary. All participants had been involved in the GOKA program prior to the co-design sessions and thus were familiar with the program content and facilitator. From the sample of 60 participants (i.e. 10 adolescents per co-design session), 58 adolescents arrived to the scheduled co-design sessions and participated in the entire session.

The co-design sessions were restricted to a timeframe of 60 minutes to ensure that participants did not become fatigued. Sixty-minute sessions have been found to be ideal in length when working with vulnerable groups (Vaughn *et al.*, 1996). To maximize active participation the facilitator aimed for a private setting. In all sessions the facilitator emphasized privacy and confidentiality for participants in order to allow them to express their creativity and share openly their thoughts and feelings about sensitive, alcohol-related materials.

Steen *et al.* (2011, p.53) stress the importance of articulating "precisely and realistically which specific benefits [co-design sessions] aim to achieve". The facilitator invited and briefed the participants on two key dimensions. First, the participants were asked to reflect on their experiences with the GOKA program in which they had previously participated and second, they were invited to help create a more user-centered version of GOKA. The facilitator emphasized that both negative and positive comments

were welcomed and expected. The facilitator also took care to encourage quiet participants to voice their opinions by directing specific questions to them. The final collage drawing activity allowed participants that were less outspoken in the discussion to write and reflect through a different medium.

4. Findings

Application of co-design tools

To empower the participants to review the individual alcohol education program activities and to develop their own preferred programs within the timeframe of 60 minutes a card sorting activity was employed. To evaluate the usefulness of the card sorting activity for co-design with vulnerable participants we applied the framework suggested by Sanders *et al.* (2010). Their framework (Table 1) specifies participatory design tools and techniques that can be employed to engage non-designers in collaborative activities (e.g. making, telling and/or enacting) and/or for a particular purpose (e.g. for probing participants, for priming participants, to get a better understanding of their current experience or to generate new ideas or design concepts).

Table 1 – Tools and techniques used in co-design

Tools/Techniques	Probe	Prime	Understand	Generate
Telling (Cards)				
Rate and discuss existing GOKA games and activities.	✓	✓	✓	
Rate and discuss a range or other potential games and activities that were not part of GOKA (included nine games and activities).	✓	✓	✓	
Making (2-D collages)				
Suggest new games and activities or improve existing ones.			✓	✓
Enacting (2-D collages)				
Adolescents create their own unique alcohol education program.				✓

Source: Adapted from Sanders et al., (2010)

The card sorting activity was found to be useful for engaging the participants in “telling” and “making” as well as “enacting” (see Table 1). In particular, the cards were beneficial for rating and discussing the individual activities in a playful way (i.e. telling). We additionally used blank cards, which allowed participants to provide suggestions to improve existing activities and/or develop new games and practical activities (i.e. making). Finally, participants could use selected cards and assemble 2-D collages, hence developing their own unique alcohol education program (i.e. enacting).

We also examined the card sorting method in their capabilities to assist in “probing” and “priming”. Probing participants means developing a conversation between users and the design researcher to gain a better understanding of a context of use and to help spark new design ideas (Mattelmäki, 2008). Priming participants means immersing participants into the topic with the aim to encourage and motivate them to contribute (Sanders *et al.*, 2010). These capabilities were indicated during the card sorting activity. The use of blank cards and the development of 2-D collages also enabled “understanding” and “generating” as these activities provided a better understanding of the participants’ perceptions of the current alcohol education components and allowed them to generate new ideas for activities and program content.

Co-design facilitation

The first stage of the co-design sessions focused on the games and activities that were part of the one-day GOKA program (see Table 2). We deliberately chose to begin the co-design sessions with the previously experienced games and activities to develop familiarity, encourage discussion and build confidence among the participants. In accordance with the card sorting method the games and activities were summarized on laminated cards printed approximately A8 card-sized format (see Figure 1 for an example). All adolescents were instructed to individually assess each of the activities and remember where and how they took place before sorting activities into three distinct piles: “likes”, “dislikes” as well as an “unsure” category.

Table 2 –Activity description

GOKA Activities	Description	Newly proposed activities	Description
1) Dumb Driver	Simulates effects of drink driving and how vision is impaired.	1) Alcohol & Body	Adolescents’ label and identify body parts that are affected by alcohol consumption.
2) Perfect Pour	Learn about standard drinks by pouring different types of beverages.	2) Calorie Matching Activity	Provides pictures of foods and students are then required to match these to the amount of calories contained in alcoholic beverages.
3) Beer Goggles	Beer goggles ‘walk’ with each goggle simulating different blood alcohol concentration levels.	3) Drink Victim Reports	Students get exposed to a real life story about how harmful drinking alcohol can be.
4) Passing Out Activity	Students ruffled themselves up (untuck shirts) and lie in the gutter to simulate the effects of being passed out.	4) Discussion Session	Features a five minute video clip about binge drinking in Australia and followed by an in-class discussion.
5) Writing Activity	Reflect on an incident involving alcohol that they experienced, witnessed or heard about.	5) Drinking Mirror Game	Students take a picture of themselves and upload it into the Drinking Mirror App which then simulates (depending on the amount they are planning to drink) how adolescents’ will look up to 10 years in the future.
6) Pledge	Reflect on future drinking behaviour and how students’ would help their friends or themselves to stay safe during a night out.		
7) Standard Drink Pouring Activity	Calculate a standard drink of a beverage and students’ proceeded to pour the same amount by using a soft drink and a plastic cup.		
8) Moderation Strategy	Worksheets featured different strategies on how to abstain or moderate alcohol drinking and students’ proceeded to discuss which strategies were applicable.		

Figure 1 – Example of two cards used in card sorting activity

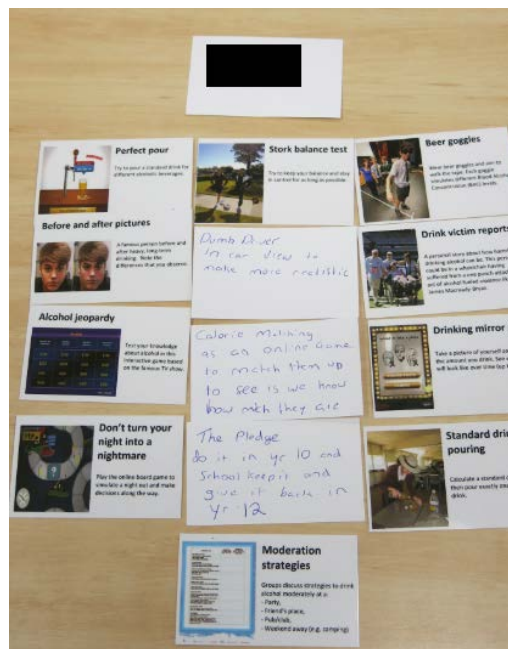


After this individual assessment the researcher selected one of the activities and invited each adolescent to share their reasoning of why they had placed it into either the like or dislike category. A number of probing questions were used to gain deeper insights regarding the adolescents' preferences and perceptions of the games and activities that were part of the current GOKA program. This warm-up exercise led to discussions and debates among adolescents in regards to their preferences and beliefs about the specific games and activities they experienced during the one-day program.

After completing the warm-up exercise, cards were distributed that represented games and activities that were not part of the GOKA program (see Table 2), sourced from previous alcohol education programs (e.g. Alcolado and Alcolado, 2011; Hardoff *et al.*, 2013; Will and Sabo, 2010). These activities were novel to the adolescents and once again the researcher gave them time to carefully review each card and then instructed them to follow the same classification procedure that was utilized for the first set of cards. The researcher then went through the activities and invited each adolescent to once again share the reasoning behind their assessment and aimed to gain deeper and more meaningful insights with regards to individual activities. The aim of this exercise was to foster creativity and to provide the participants with a broader background understanding of the topic and design objective in question (Steen *et al.*, 2011).

During the final stage of the co-design session participants were given a set of blank cards in the same size and format as the previous activity cards. The researcher provided two guidelines for adolescents to stimulate output: adolescents were invited to either improve any of the existing GOKA and newly proposed activities and games *and/or* to develop (sketch/map out) an idea/activity/game of their own. As part of this exercise participants were also asked to propose their own alcohol education program by using any of the available games and activities, including their own suggestions providing they had created some. A photograph was taken of each participant's co-designed program (see Figure 2).

Figure 2 – An adolescent’s designed program



We found that the 2-D collages were particularly useful for engaging more quiet participants that were then able to express their preferences in this individual activity. Whilst the card sorting activity presented an innovative method of fostering creativity and reflection, we also identified room for improvement. For example, the facilitator realized that some participants struggled to capture all their ideas on the blank cards, which suggested that the cards were too small in size. The 2D collage activity could also have presented participants with larger blank cards, butcher paper, post it notes, stickers and colored pens to more creatively express their design. With regards to the activity cards that featured existing GOKA program and evidence-based program activities, some users reported difficulty remembering activities or were confused by the short description. Larger cards with more a better visual representation of the activity and more detailed text may be able to prevent this confusion. Yet, initially introducing participants to cards that showcased familiar activities worked well, as it helped adolescents reflect on the day they took part in and provided a warm up exercise that assisted the creative process rather than starting with unknown activity cards or a blank canvas.

Co-design outcomes

Following from the co-design facilitation, we were interested in how the participants perceived the individual alcohol education program activities, what specific suggestions for improvements were made by them, and whether these were feasible with regards to their implementation. Table 3 lists eight GOKA activities and describes the activities that were improved by the participants during the co-design sessions. The improvements were based on the users reflecting on personal experiences with the current

alcohol education program activities as well as discussing five newly-introduced activities that they had not previously been exposed to. The latter is featured in Table 4. Both tables contain information on feasibility as well as user quotes.

Table 3 – GOKA activities

Activity	Perceptions	Improvements	Feasibility	Quotes
Dumb Driver	Positive perceptions relating to fun, interactivity, competitiveness, and challenging enough to encourage repeat play.	Improvements to game play (e.g. more realistic BAC representation, feature brakes, variety of pubs) and game design (3D rather than 2D, bends in roads, feature a leader board, select one's car).	Changes are feasible to be incorporated as long as they are enhancing the game experience and repeat play. More complex changes (e.g. 2D to 3D experience) are likely to require substantially higher monetary commitments.	F, 15: ... <i>to make it better you get to choose your car and you need some brakes. Maybe in a 3D perspective like Need For Speed.</i>
Perfect Pour	Engagement, competition, fun and an element of surprise with regards how easy it was to over pour a drink encouraged multiple game plays.	Combination of the Perfect Pour game with the Standard Drink Pouring Activity.	Combining Perfect Pour and Standard Drink Pouring is feasible and likely to produce a more concise, engaging and interactive component of the program.	M, 15: <i>You can do it like a memory test as if you played a perfect pour game first and then you have different bottles with what drinks were in the game and then you got to pour so much in a cup.</i>
Beer Goggles	Challenging real-world experience that was fun and engaging.	Ideas that make the activity more challenging (e.g. obstacle course) and provide a more realistic experience (cones, picking up keys).	Suggested features can be implemented without the requirement of monetary resources. Additional time needs to be allocated to this activity.	M, 15: <i>Add something ... and put it into a situation that makes it feel more real... tie your leg to someone else's and then you got to try to get through the obstacle course...</i>
Passing Out Activity	Negative perceptions mostly, centring on themes of boredom, meaningless and unrealistic.	More realistic environment to 'pass out' in (e.g. darker setting, getting mugged) and additional equipment that impairs student senses (e.g. ear muffs and beer goggles).	A more realistic scene can be implemented by using a pre-recorded audio-file that simulates noises from a night out, dimming lights, handing out beer goggles as well as ear muffs.	F, 15: ... <i>if you're going to be drunk and pass out somewhere then you might be in the city and there might be weird noises at night so they could put on an audio...set the scene a bit and a car crash or sirens or something... make it a bit more intense ...</i>
Writing Activity	This activity was boring and unengaging for most. Only students that had a story to share enjoyed this activity.	Limited amount of suggestions (e.g. read out most interesting stories in front of class).	More time consuming and additional screening of stories required. May sacrifice authenticity of stories and potential stigmatisation issues.	M, 15: ... <i>if you were to read it out then that would make people think more about drinking alcohol.</i>

Pledge	Split opinions ranging from pointless to it being a good reflection task as well as a meaningful experience with a good goal setting exercise.	Reduce size of pledges so that they could fit into a wallet. School staff collects filled-out pledges and returns them at graduation or end of term.	A pocket card sized pledge and teachers collecting pledges and returning them at key decision points (e.g. end of school term/ before holiday) is feasible.	M, 14: <i>...if it's a teacher you're interaction with them stops essentially at 3 o'clock and you don't have parties from 8.30 to 3.00.</i>
Standard Drink Pouring Activity	Mathematical component was mostly perceived as a boring whilst the pouring activity was described as engaging, entertaining and fun.	Pouring standard drinks immediately after playing the Perfect Pour game, featuring the identical beverages used in the game.	Combining Perfect Pour and Standard Drink Pouring is feasible and likely to produce a more concise, engaging and interactive component of the program.	M, 15: <i>...do it like a memory test as if you played perfect pour first and then you have different bottles with what drinks were in the game and then you got to pour so much in a cup.</i>
Moderation Strategy	Too lengthy, boring, confusing and some students did not even remember it.	Increase interactivity, reduce amount of strategies, and allow more time and space for discussion in smaller and more trusting environments.	Back to the design board before a second-round co-design session.	M, 15: <i>... It could be more interactive. Maybe if someone up the front was going through it...and we were all talking about it...[make it] a bit more fun.</i>

Table 4 – Additionally proposed activities

Activity	Suggestions	Feasibility	Quotes
Alcohol and the Body	Activity should feature how the body would look after drinking alcohol. Gamification and interactivity were suggested (e.g. through a quiz or interactive puzzle).	Suggestions are feasible and should be brought forward into a game brief.	M, 15: <i>“You could do it even as a game. It can show how much intake and have the body parts [show] how much it affects them...”</i>
Calorie Matching Activity	As a mobile app that can be used outside of the class room. Added feature suggested in form of understanding how much exercise it will take to burn of calories from drinking alcohol.	Developing this as a mobile app rather than an online game increases the chances of a prevention service outside of school hours.	M, 14: <i>With the new calorie match ups idea it would be better to not only have the theory part with it but actually tell us how much exercise we have to do to get off those calories.</i>
Drink Victim Reports	Mostly well perceived activity that students’ believed to be powerful and engaging. Students’ suggested featuring the Pledge straight after the ‘victims’ presentation including time for discussion.	Resourcing speakers over continued periods for prevention programs is challenging (a pre-recorded video may work). Featuring the Pledge activity post the presentation is a good strategic fit in getting students to reflect on their future actions.	M, 15: <i>My brother's 18th. We had about 80 odd people there and they had drinking games and people got to a point, the angry drunks... There was about five people having a full on brawl and people got sent in ambulances... [one person] couldn't walk ever again. It got to that point.</i>
Discussion Session	Students saw value in a discussion activity as long as it would be engaging and connected to real life events (e.g. feature realistic examples).	Discussion formats work better in smaller group settings (n<25) and should only then be applied. Featuring a discussion session post the ‘drink victim’ reporting is likely to stimulate debate and raise questions.	M, 14: <i>...I reckon combining the drink victim report with the discussion section would be good because using the personal victims report would give an insight into the story further than probably the current affairs video.</i>
Drinking Mirror Game	Students’ were interested in experimenting with the game. There was interest in even longer-term simulation effects than currently featured as well as incorporating the game into a photo booth experience.	A mobile photo booth ranges between \$AUD 2000 – 5000 and are therefore is certainly a feasible component for a next generation program.	M, 15: <i>You could sit in it and you'd just be sitting there [photo booth]. You'd take the picture and then it'd come up on the screen or something like that.</i>

Users were willing and able to suggest a number of additional and concrete features when designing activity-based alcohol education activities, whether in the form of online games or practical activities. The inductive coding procedure identified seven reoccurring themes that emerged as part of the improvements that were suggested by the users in the co-design sessions: additional features (12), combining activities (6), realism (5), challenge (3), interactivity (2), interaction (2), and gamification (2). However, the participants primarily focused their attention on activities and games that they were most engaged with. In general this referred to activities that were closely related to or simulated real-life experiences. Improvements focused on making the activities more realistic, challenging, as well as suggesting additional features in order to improve engagement. Furthermore, a number of important suggestions were made in the co-design sessions that provided evidence for the engagement and critical reflection that vulnerable users provided during the co-design sessions.

In contrast to the positive findings, it was also observed that users faced difficulties in articulating a larger variety of and more concrete suggestions regarding activities that were less popular or not remembered well. This highlights the gap between expert-driven service design and actual user experiences and supports findings from previous studies indicating that if user engagement is not facilitated the effectiveness of such program activities is questionable (Dearing *et al.*, 2005; Low *et al.*, 2014). It emphasizes the importance of co-design because, as shown in this research, the suggestions provided by users particularly focused on making the activities more realistic, challenging and interactive in order to enhance engagement. Both, interactivity (Cuijpers, 2002; Foxcroft and Tsertsvadze, 2012b; Onrust *et al.*, 2016; Tobler and Stratton, 1997) and engagement (Dearing *et al.*, 2005; Low *et al.*, 2014) have been established as key ingredients to designing better service offerings for vulnerable consumer groups. Therefore, co-design practices contribute to a better balance between evidence-based practice and design that is tailored to improve user experience.

These findings underline the potential benefits of co-design. Users were able to provide insights into important features and utilities that were currently missing in particular activities and which they believed to be important to increase user engagement. This is in accordance with previous research showing the importance of active user involvement to the improvement of the user value of a newly developed service (Kristensson *et al.*, 2004; Magnusson *et al.* 2003). In the current study, the involvement of vulnerable consumers (i.e. adolescents) not only led to improved outcomes that might engage and motivate this group to learn about alcohol but, more importantly, enable them to make more informed decisions.

5. Implications

This article contributes to the service research literature by investigating how vulnerable consumers can be involved in transformative service design. Little is known about how vulnerable

consumers can effectively be involved in the co-design of transformative services and how their involvement may contribute to improved design outcomes (Ostrom *et al.*, 2015). The present research goes some way to addressing this knowledge gap. It reports on the insights generated from six co-design sessions that involved vulnerable consumers in the design process of a specific transformative service - an alcohol education program targeted at adolescents. As part of the preparation phase, and as reported in the method section, insights were generated in terms of how the co-design process can be planned as well as vulnerable consumers be recruited and sensitized for participation in this process. In turn, the facilitation and outcomes of the co-design sessions provided insights on the required facilitation procedures, including the use of different design tools, in order to ensure that the generated outcomes align with set objectives. The implications resulting from this research are discussed in the following sections.

Theoretical implications

Although previous research has contributed generic frameworks for active user involvement processes (Alam, 2002; Hoyer *et al.*, 2010), including co-design (Mattelmäki and Visser, 2011; Steen *et al.*, 2011), our findings suggest the need for an adapted framework for vulnerable consumer groups. Thus, based on the insights generated from the six co-design sessions as well as the examination of the relevant literature on user involvement and co-design, we propose a six-step framework for the involvement of vulnerable consumers in co-design processes. The six steps comprise resourcing, planning, recruiting, sensitizing, facilitation, and evaluation. This section describes each step in detail and discusses how co-design with vulnerable consumers differs from conventional user involvement processes. An overview of the key differences is provided in Table 5.

Table 5 – A comparison of conventional and vulnerable user involvement processes

Conventional user involvement process	Selected key studies	Vulnerable user involvement through co-design	Selected key studies
Resourcing			
- Generic innovation tools - Users do the research/resourcing	von Hippel (2001; 2005)	- Topic-specific design tools - Experts do the research/resourcing	Clatworthy (2011) Visser <i>et al.</i> (2005)
Planning			
- Experts plan/communicate directly with users (e.g., online platforms, social media)	Boudreau and Lakhani (2013) Poetz and Schreier (2012)	- Experts plan/communicate with users via intermediaries (e.g. governmental departments, non-profits, schools and other service providers)	Donetto <i>et al.</i> (2015)
Recruiting			
- Users self-select - Users are driven by specific motivations	Franke <i>et al.</i> (2006) Lettl (2007)	- Recruitment through intermediaries - Incentives for participation might be required	Steen <i>et al.</i> (2011) Visser <i>et al.</i> (2005)
Sensitizing			
- Users are knowledgeable about the topic - Sensitizing through challenges/competitions	Füller <i>et al.</i> (2011) Poetz and Schreier (2012)	- Users need to be introduced to the topic - Trust needs to be developed with the facilitator	Mattelmäki and Visser (2011) Steen <i>et al.</i> (2011)
Facilitation			
- Users design/innovate independently - Experts participate as consultants - User-driven process	Magnusson <i>et al.</i> (2003) Schreier <i>et al.</i> (2012)	- Stepwise user empowerment is required - Experts participate as facilitators - Expert-guided process	Engström and Elg (2015) Mattelmäki and Visser (2011)
Evaluation			
- Focus on service innovations that deliver user value, feasibility, and originality	Magnusson (2009) Magnusson <i>et al.</i> (2003) Poetz and Schreier (2012)	- Focus on service innovations that deliver transformation, consumer wellbeing and social change	Cottam and Leadbeater (2004) Lundkvist and Yakhlef (2004) Visser <i>et al.</i> (2005)

1. *Resourcing*: In conventional user involvement processes this step is ‘outsourced’ to users through the provision of suitable innovation tools. This process, also labelled as ‘democratizing innovation’ (von Hippel, 2005), focuses on empowering users to take over innovation activities that were traditionally the responsibility of firm-internal experts or designers (von Hippel, 2001; Fuchs and Schreier, 2011). For example, through the provision of maker labs or innovation platforms users can innovate independently and thereby source the required information from different resources (Franke *et al.*, 2006; Lüthje, 2004). This may not be possible when co-designing with vulnerable consumers as these users might not have either the willingness or the ability to innovate independently. They may also be sensitive to the nature of the topic and therefore more reluctant to participate. Thus, experts or researchers take on a key role during this stage by sourcing relevant inputs (e.g. program components, products/services, best practice examples) as well as reflecting on potential barriers that may hinder participation. Finally, as is shown in the present study, the resourcing stage is important to gain a better understanding of the underlying problem/task to be addressed and to develop the topic-specific design tools (e.g. activity cards) to be used in the co-design sessions.

2. *Planning*: During the planning stage of a user involvement process, experts typically collaborate and communicate directly with their users on matters such as organizing user meetings in innovation labs (Boudreau and Lakhani, 2013) or supporting users to independently innovate in their space (Franke *et al.*, 2006; Lüthje, 2004). In contrast, as shown in the present research, co-design with vulnerable consumers often involves close collaboration and communication with intermediaries such as government bodies and not-for-profit organizations rather than the customer. The condition of vulnerability may preclude or render impractical direct collaboration or communication between the consumer and the expert. For example, the user group might be ‘cared’ for by a public institution owing to their specific vulnerability (e.g., patients in health care facilities, support service users). This implies that a number of interactions (e.g. phone and face-to-face meetings) will be required with relevant stakeholders to coordinate and agree on the methods of recruiting participants (e.g. screening methods and advertising methods) as well as receiving approvals, coordinating co-design session venues and times, and the co-design facilitation. The present study showcases this in form of lengthy negotiations in order to gain the schools’ support and approval to recruit and conduct co-design sessions. This stage also involves the planning ahead for unexpected events that might occur during the co-design session (e.g., drop-out/ disengagement of participants, conflicts, off-topic discussions, etc.). Overall, the planning stage serves as an opportunity to plan the subsequent recruitment, sensitization, facilitation and evaluation stages.

3. *Recruiting*: Previous user involvement studies focused on identifying and recruiting innovative groups such as ‘lead users’, ‘early adaptors’, or ‘market mavens’ (Matthing *et al.*, 2006; Hoyer *et al.*,

2010). The involvement of lead users has been shown to be particularly effective as these types of users are typically highly capable and motivated to contribute to innovation and development activities (Franke *et al.*, 2006; Lettl, 2007). While some studies show that innovative users might be self-selecting owing to their strong motivation to innovate (e.g., innovation-related benefits, recognition, interest in innovation or the product/service) (Poetz and Schreier, 2012), others highlight the costs and time that can be involved in the recruitment process (Edvardsson *et al.*, 2012). Differently to innovative user groups, vulnerable consumers may not have the motivation to contribute to collaborative design activities, especially in sensitive topics (e.g. alcohol education). Thus, identifying and recruiting a sufficient number of suitable users for involvement in co-design activities is likely to require close collaboration, perseverance, and the development of on-going partnerships with relevant stakeholders. The recruitment process can be lengthy and resource intensive (Visser *et al.*, 2005), which might add to the reason why healthcare services (Donetto *et al.*, 2015) or alcohol education programs are predominantly designed with little or no user involvement (Dietrich *et al.*, 2016). This study highlighted the importance of tapping existing partnerships which were established through the intervention trial with key school staff members. These school staff members turned out to be an important asset in the recruitment process as they assisted in the identification and recruitment of sufficient number of participants for the co-design sessions. Thus, the recruitment phase requires the establishment and ongoing nurturing of relationships with relevant partner organizations and their staff.

4. *Sensitizing*: Sensitizing does not find application in the user involvement literature per se because targeted user groups typically are highly knowledgeable within the field. In fact, as shown by Magnusson *et al.* (2003) consulting by experts before the innovation activity can even negatively influence the generated outcomes. Yet, this stage might arguably be related to ‘setting the scene’ either through the definition of a specific challenge or competition (Piller and Walcher, 2006; Poetz and Schreier, 2012). For example, Füller *et al.* (2011) found that the experience environment is fundamental for encouraging users to explore a challenge collaboratively or contribute with new creative ideas. In the context of vulnerable user involvement, sensitizing is more concerned with the preparation of participants for the actual co-design session. Specifically, during this stage, the co-design participants should be made familiar with the requirements of the co-design session or the actual service to be re-designed (Steen *et al.*, 2011; Visser *et al.*, 2005). It can also inspire preliminary ideas for a new service by asking thought-evoking questions which encourage reflection. As shown in the current study, the sensitizing stage was critical for the effectiveness of co-design with vulnerable consumer groups because it allowed users to experience and test the designed activities and become familiar with the respective research context. The sensitizing stage additionally fostered user engagement and identification with the program. This may be particularly important for public service organizations and

sensitive topics with which users do not readily identify themselves or proactively engage with (Engström and Elg, 2015).

5. *Facilitation*: Previous research showed that active user involvement can effectively be facilitated through competitions (Piller and Walcher, 2006; Schreier *et al.*, 2012) or face-to-face sessions in innovation labs (Boudreau and Lakhani, 2013). This stage thereby is often user-driven and if experts are present they take on a passive consulting role (Magnusson *et al.*, 2003). Mostly, however, conventional users design or innovate independently (Fuchs and Schreier, 2011), which may reflect their lead user status. In contrast, experts might need to take a more central role in co-design activities that involve vulnerable consumers. As shown in the present study, co-design with vulnerable consumer requires careful guidance by a trained facilitator. Such a co-design process might start with an ‘ice-breaker’ activity to allow participants to become familiar with the facilitator and the objectives of the co-design activity. Then the focus can turn to individual activities and/or in-group discussions, followed by the development of ideas. During this stage, all co-design tools (e.g. role playing, mock-ups, cards, canvas) should be considered and selected based upon the potential to empower participants and encourage collaboration and creativity. In the present study, card sorting and collage making were found to be particularly useful to foster creativity and gain insights into the participants’ preferences and beliefs about the specific games and activities they experienced during the sensitizing stage and empower them to design their preferred alcohol program. Similar to previous studies (e.g. Clatworthy, 2011; Mattelmäki and Visser, 2011), the application of topic-specific design tools, informed by the preceding resourcing stage, can empower participants and facilitate collaboration and creativity during the design process.

6. *Evaluation*: User generated ideas or innovations are typically evaluated in terms of innovation outcomes, including originality, feasibility, and user value (Magnusson *et al.*, 2003; Poetz and Schreier, 2012; Witell *et al.*, 2011). A key focus thereby is on identifying radical new ideas that are valuable for the firm’s innovation process (Magnusson, 2009; Poetz and Schreier, 2012). Co-design processes involving vulnerable consumers are likely to follow different outcome objectives, such as transformation and improving consumer wellbeing. As experts of their experiences, users may be an important contributor to transformative service design and the improvement of wellbeing (Cottam and Leadbeater, 2004; Lundkvist and Yakhlef, 2004). Although evaluation is important for all user involvement activities, it is particularly so in the context of vulnerable consumers given the dearth of previous research in this area and the participation of users who are likely to differ in their motivation and ability to contribute to these activities (Engström and Elg, 2015). If executed poorly, involvement of vulnerable users may lead to costly new service failures (cf. Ostrom *et al.*, 2015). The co-design outcomes generated by the participants in the current study led to improvements in game and activity

design, new combinations of existing activities, and even new design ideas. Overall, the participants contributed unique knowledge about their needs and preferences, which subsequently informed the design of the updated alcohol education program's activities. Thereby, feasibility was gauged by the research team with regards to cost and time to market. The present study also showed that vulnerable consumers had difficulty to remember and therefore contribute to activities that they were less engaged with. This creates an additional challenge to the overall outcomes and success of co-design activities as users might not be able to provide meaningful feedback and ideas for improvement if they are not engaged in the activity in the first place. Still, the findings of this study will assist in further narrowing the gap between the current service design (i.e. alcohol education program) and the user's wants and needs to foster more engagement and ultimately consumer wellbeing.

Practical implications

This study provides a guide on how co-design activities with vulnerable consumers can be effectively resourced, planned, recruited, sensitized, facilitated, and evaluated for transformative service design. The six-step framework identifies important differences that need to be considered by organizations seeking to involve vulnerable consumer groups through co-design. Apart from the more expert-driven and resource-intensive nature of the resourcing, planning, recruiting, and facilitation stages, the sensitizing of participants before the co-design facilitation stage may be critical to co-design success. Empowering participants to clearly define their preferences and encouraging and motivating them to share their 'voice' can be very challenging when working with vulnerable consumers (Ringold, 2005; Spotswood and Nairn, 2016). As shown in the current study, the co-design facilitation combined with the preceding sensitizing stage did provide a better understanding of user experiences and preferences and encouraged users to take ownership in improving the expert-designed program. This is an important aspect because, as emphasized by Junginger (2009), the aim of service design is not only to improve the service provision per se but also to have a transformational impact by creating collaborative service models that work for people "outside" and "inside", thus bringing perspectives and experiences of "other people" into the organization through the practices of designing. While one-off co-design sessions may have limited substantial transformational impact, such sessions serve as an important starting point for uncovering and questioning traditional expert views and assumptions on service production and delivery (Sangiorgi, 2011), thus closing the gap between expert-design and user wants and needs.

Further, during the facilitation stage the card sorting activity proved to be a beneficial tool to engage adolescents and was particularly useful for optimizing the short timeframe that was available to the facilitator (Clatworthy, 2011). It allowed the facilitator to gain input from each participant, encouraged in-group discussions, and effectively empowered the vulnerable consumer group. This is an important finding as Cottam and Leadbeater (2004) suggest that the most underexplored and

untapped resource in health care are the users. The application of cards may also be of particular importance for co-design because, as noted by Lundkvist and Yakhlef (2004), ideas do not exist in abstractum but take shape in and through conversational engagement between users and designers. Understanding that users are in fact experts of their very own experiences and can therefore significantly contribute to improved service design may offer a direct means to enhance wellbeing.

Lastly, it might be difficult for untrained designers or researchers to successfully facilitate co-design processes with vulnerable user groups. Successful co-design facilitation requires certain skills including the development of a trusting environment between the involved users and the experts, providing users with guidance during their participation, and engaging and empowering each individual to contribute and share his or her experiences (Sangiorgi, 2011). This finding implies that co-design is not something that anyone can facilitate, even if the appropriate design tools are applied. Using a toolbox metaphor, Blomkvist and Segelström (2015) highlighted: “one has to fill one’s tool-box with various tools, but just having a full toolbox does not make someone into a craftsman”. It is just as important to learn which tool to use for which purpose and to be able to find new solutions when the existing tools are not enough.” This argument has been supported in the current study as the researchers needed to facilitate a trusting environment to allow participants to openly share their experiences, carefully encourage quiet participants to voice their opinions, and trigger ongoing initiatives by allowing users to take ownership of the program (cf. Manzini and Rizzo, 2011). Thus, the application of appropriate design tools is unlikely to be sufficient, but rather should be seen as a supportive element of co-exploring and co-designing (Clatworthy, 2011; Mattelmäki *et al.*, 2011).

6. Limitations and future research

Despite its contributions, this research has limitations. The study took an early step in proposing a six-step framework that identifies how the involvement of vulnerable consumer groups through co-design differs from conventional user involvement processes. For practice, the framework provides guidance for successfully facilitating co-design sessions with vulnerable consumers. We see merit in the co-design framework for a) striking a better balance between evidence-based practice and activity designs that are more appealing and engaging to vulnerable consumers and b) contribute to further improving existing services to enhance their experience and engagement. Nevertheless, given the qualitative nature of the study it is important to acknowledge that while our co-design framework worked well within the vulnerable adolescent group examined by the research, its generalizability is currently limited to the context of this study (Maxwell, 1992; Johnson, 1997). However, given its strong foundation in the co-design literature (Donetto *et al.*, 2015; Mattelmäki and Visser, 2011; Manzini and Rizzo, 2011; Steen *et al.* 2011; Visser *et al.*, 2005), the proposed six-step framework and utilized tools in this study may be useful for involvement of other vulnerable consumer groups to gain insights to

inform the design of other transformative services such as health and financial services. Further empirical testing is required and warranted.

This study was restricted to six private, religiously-denominated (Catholic) schools in one state of Australia that had participated in the GOKA program. The sample included urban and regional schools. It is important to note that past research shows no association between socio-economic status and alcohol consumption in adolescence (e.g. Tuinstra et al., 1998), although more recent research suggests that adolescents from affluent backgrounds drink even more alcohol (e.g. Pedersen et al., 2015). Similarly, the results surrounding religious influence on drinking is complex (see Brown et al., 2001) and it is important not to assume that the adolescents in the study subscribe to the religious beliefs of their school. Although beyond the scope of the current study, future research should examine the co-design framework and its utilized tools in service design of other school-based programs as well as other transformative services to further improve its generalizability.

Finally, we recommend comparing the card sorting to other co-design techniques (e.g. 2D collages, diaries, acting, games and props) to understand whether the co-design technique used impacts the design outcome. It would be interesting to investigate the suitability of the card sorting method in co-design sessions when taking into account vulnerable consumers' participation styles. Engström and Elg (2015) identified a number of styles, such as playful or social, of participation in service design which may influence the usefulness of a card sorting approach. It will also be important to investigate the application of different co-design tools to different contexts and populations of vulnerable consumers (e.g. mentally ill, elderly, etc.).

7. In summary

Service design for vulnerable consumers has been identified as a key priority to advance and benefit the service field (Ostrom *et al.*, 2015). This research contributed to this priority by investigating how vulnerable consumers can be involved in the co-design of transformative services aiming to improve consumer wellbeing. A fundamental principle of co-design is ensuring that (vulnerable) consumers are empowered to contribute to the design process (Mattelmäki, 2008), which is important given that consumer empowerment is vital to addressing consumer vulnerability (Baker *et al.*, 2005). Despite this, current user involvement frameworks do not account for the unique characteristics of vulnerable consumer groups that may influence the efficacy of this approach to service design.

To address this gap, the present research investigated how one vulnerable group, namely adolescents, could be involved in the co-design of an alcohol education program. A comparison to conventional user involvement processes, led to the identification of important differences that need to be considered by both researchers and practitioners when vulnerable consumers are to be involved through co-design. As a result of this investigation, a six-step co-design framework comprising resourcing, planning, recruiting, sensitizing, facilitation, and evaluation for the involvement of

vulnerable consumer groups in co-design was proposed. The research further showed that the involvement of vulnerable consumers can contribute to important improvements to transformative services and, as such, has the potential to reduce the gap between expert-design and user needs and contribute to improved wellbeing benefits. This research provides an important basis for research and practice in the nascent, but growing field examining the intersection of transformative services and vulnerable consumers.

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