


Posttraumatic growth in post-surgical coronary artery bypass graft patients

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Abstract

Recent research in posttraumatic growth has been applied to people with life-threatening illnesses to optimise recovery. There is a lack of research exploring posttraumatic growth in coronary artery bypass graft patients. This article describes the recovery experience of 14 coronary artery bypass graft patients (13 males and 1 female) at their first outpatient review post-surgery. Grounded theory analysis was used to develop a model of distinct and shared pathways to growth depending on whether patients were symptomatic or asymptomatic pre-coronary artery bypass graft. Outcomes of posttraumatic growth in this sample included action-based healthy lifestyle growth and two forms of cognitive growth: appreciation of life and new possibilities. The model of posttraumatic growth developed in this study may be helpful in guiding future research into promoting posttraumatic growth and behaviour change in coronary artery bypass graft patients.

Keywords

coronary artery bypass graft, grounded theory, posttraumatic growth, qualitative analysis

Coronary artery bypass graft (CABG) is one of the most cost-effective, long-lasting surgical revascularisation treatments for reducing both current and future cardiac symptoms and improving overall quality of life in complex coronary heart disease (CHD; Birim et al., 2012). In the 3 months post-surgery, it is normal for patients to suffer both physically (e.g. fluid retention, post-surgical pain, muscle soreness, fatigue, dyspnoea, fluctuations in heart rhythm, limited mobility and short-term cognitive impairment) and psychosocially (e.g. nervousness, decreased self-confidence in capabilities, feelings of lack of control and increased dependency on caregivers; Bergvik et al., 2010). Current research indicates that 16–38 per cent of post-surgical CABG patients will experience depressive symptoms, 31–46 per cent anxiety symptoms (Connerney et al., 2010; Oxlad et al., 2006; Tully et al., 2008) and 3–18 per cent posttraumatic stress symptoms (PTSS; Bluvstein et al., 2013; Oxlad and Wade, 2006; Schelling et al., 2003). In addition to CABG patients experiencing high rates of mental illness, mental health problems in this population are associated with poor health outcomes. For example, clinical depression has been strongly linked with delayed wound healing (Bluvstein et al., 2013), further cardiac symptoms (Connerney et al., 2010) and longer and repeated unexpected hospital visits (Tully et al., 2008).

While mental health problems post-CABG are common, research also indicates that most CABG patients are able to make sense of and accommodate these post-surgical challenges (Heng-Hsin et al., 2008). Doka (2009) emphasised that coping with these common post-surgical challenges is aided if the patient has comprehended the diagnosis. This meaning-making process is important at the time of diagnosis with a high frequency of people interpreting such events as traumatic as they face mortality issues and identity crises (Bostock et al., 2009). Current research in the area of adverse events, which encompasses major surgeries like CABG, is progressing from the mere understanding how people adapt and adjust to a traumatic event (Bostock et al., 2009; Sheikh, 2004) to the understanding of potential of psychological benefits and personal growth following CABG surgery (Ai et al., 2013; Leung et al., 2012).

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The model of posttraumatic growth (PTG) developed by Tedeschi and Calhoun (1995) is one of the most recognised models of personal growth in the aftermath of trauma. Five dimensions developed from the Posttraumatic Growth Inventory (PTGI) are described in the PTG model: appreciation of life, relating to others, new possibilities, personal strength and spiritual change (for a thorough review of the dimensions of PTG, refer to Tedeschi and Calhoun (1996)). PTG has been linked with lower rates of depression and greater positive well-being (Helgeson et al., 2006). While other cross-sectional studies have failed to corroborate this reduction in depressive symptoms (Cordova et al., 2001), longitudinal studies have found more consistent results in PTG predicting lower levels of depression over time (Frazier et al., 2001). This discrepancy between findings from cross-sectional and longitudinal studies might not only be attributable to methodological differences but also to the time sequencing of causal processes.

Despite the benefits of PTG in moderating the development of mental health complications, limited research has focused on PTG in post-CABG patients. In a quantitative study, Bluvstein et al. (2013) examined PTG and mental health outcomes in post-acute CABG and myocardial infarction (MI) patients. The authors found that higher levels of PTG moderated the harmful effects of PTSD on mental health outcome. Bluvstein et al. also found a positive linear relationship with posttraumatic stress disorder (PTSD) symptoms and PTG which is consistent with research in other areas of PTG and PTSD (Dekel et al., 2012). This positive linear, as well as a curvilinear relationship, has been confirmed in a recent meta-analysis (Shakespeare-Finch and Lurie-Beck, 2014). The mechanism behind this positive relationship is still unknown but suggestions include the process of cognitive dissonance (Blix et al., 2013). That is, the stronger the posttraumatic symptoms, the more one is motivated to restore a sense of meaning and reduce distress.

While there is some limited quantitative evidence for PTG in post-CABG patients, there is also a need for an inductive approach to explore the lived experiences of post-CABG patients in an attempt to understand possible factors that may facilitate PTG in this population. There have only been two studies identified which have investigated perceived benefits of the CABG using an inductive methodological approach. One study focused on recovery expectations and perceived health benefits (Lindsay et al., 2000), while the other explored the experiences of women following CABG (Banner, 2010). While both studies provide helpful insights into the lived perspectives of CABG patients, neither study specifically examined the factors that facilitate PTG in CABG patients. Exploring PTG among post-CABG patients using an inductive grounded theory approach may help us to better understand what facilitates PTG in CABG patients which can then inform the development of interventions to promote PTG. This is then likely to

improve mental and physical outcomes in CABG patients. The aim of this study therefore was to use grounded theory analysis to develop a model of the factors that may facilitate the development of PTG in CABG patients.

Methods

Participants

A total of 15 adult patients (>18 years old, 1 to 3 months post-CABG procedure) attending an outpatient post-surgical clinic agreed to participate in this study. However, one patient later decided to withdraw from the study, so this participant's data were not included in the data analysis. This therefore reduced the total sample size to 14. Of these participants, 13 were male; 11 reported being retired, while 3 were in full-time employment; 13 were Caucasian, while 1 was Asian; 7 had an elective CABG, while the other 7 had an emergency CABG; 1 participant received a single, 3 received a double, 7 received a triple and 3 received a quadruple CABG; and 1 had comorbid vascular disease, 5 had type 2 diabetes, 1 had chronic kidney disease and 1 had comorbid arthritis. In terms of pre-morbid CABG symptoms, 4 experienced chronic breathlessness, 3 experienced severe angina, 2 were asymptomatic and 8 had acute chest/neck pain while 4 had an acute MI just prior to the CABG.

Procedure

The study employed a qualitative analysis based upon the Corbin and Strauss (2008) structured process of grounded theory method. Eligible patients were invited to take part in the study on the day of a follow-up medical appointment approximately 1–3 months after a CABG procedure. Participation involved a face-to-face semi-structured interview. The starting questions were as follows:

1. You have recently undergone cardiac surgery. Are there any silver linings or benefits associated with this surgery? What makes you think this way?
2. Can you identify any good things for you about having the surgery?
 - a. In the next 6 months
 - b. In 6–12 months
 - c. In the long-term

What makes you think this way?
3. How do you think that your life may improve once you recover from the surgery? What makes you think this way?

In accordance with the process of grounded theory (Corbin and Strauss, 1990, 2008), as the interviews progressed and a model started to develop, additional questions were included

to explore emerging categories to clarify as well as confirm or disconfirm the emerging categories. The interviews were conducted in a private room in the hospital and duration of the interview lasted between 35 and 65 minutes. After the interview, participants were asked to complete a brief demographic questionnaire and the PTGI (Tedeschi and Calhoun, 1996) which were both included for descriptive purposes. All audio-recorded interviews were transcribed verbatim immediately after each interview. As a process of member checking, participants were each mailed a summary of the main concepts that arose during their interview in order to allow them to check the accuracy of the main points extracted from the interviews. No participants expressed any disagreement with the summaries.

Measures

PTGI. The PTGI (Tedeschi and Calhoun, 1996) is a 21-item questionnaire of self-reported positive change since a traumatic event with five subscales: relating to others (e.g. 'I put more effort onto my relationships'); new possibilities (e.g. 'I am able to do better things with my life'); personal strength (e.g. 'I discovered that I'm stronger than I thought I was'); spiritual change (e.g. 'I have a stronger religious faith') and appreciation of life (e.g. 'I can better appreciate each day'). Items are on a 6-point Likert scale (0='not at all' to 5='very great degree'). The total score is calculated by summing item responses (range=0–105), with high scores representing a higher degree of positive change since the CABG surgery. The PTGI has been used extensively in PTG research and has been found to have strong internal consistency (Cronbach's $\alpha = .90$, Tedeschi and Calhoun, 1996; $\alpha = .95$, Cordova et al., 2001).

Demographic questions. Participants were asked to self-report their age, gender, education, occupation, marital status and ethnicity, as well as their medical history (including the number of MIs prior to the surgery, angina prior to the surgery (and if so how often), previous CABG surgeries, diagnosis of other health conditions, other prior surgeries, current medications and smoking and alcohol status).

Data analysis

Data were analysed using the grounded theory coding procedure (i.e. open, axial and selective coding) outlined by Corbin and Strauss (1990, 2008). Theoretical sampling emerged from the developing categories and their properties with participants being divided into two groups: Group A (symptomatic pre-CABG) and Group B (asymptomatic pre-CABG). The total number of participants was dependent on saturation of concepts and categories, thus data collecting was ceased when no new information emerged from the data.

Throughout the interpretive process, the validity of the grounded theory approach was upheld through the suggested

method of rigorous memos to corresponding concepts and categories (Corbin and Strauss, 1990). Furthermore, the identified concepts and categories were discussed on numerous occasions with all authors to ensure meaningful interpretation of the data. All authors engaged in constant comparative analysis and reflectivity during data analysis. That is, when analysing the data, the researchers would pose analytical questions such as why is this idea different from that idea? and how are these two ideas related? In addition, the researchers would constantly reflect upon their interpretations of the data and reflect upon the degree to which their interpretations were grounded in the data as opposed to being influenced by personal biases.

Results and discussion

PTGI descriptive analysis

The mean score on the PTGI was 70.14 (standard deviation (SD)=21.11). Mean scores ranged from 32 to 103 indicating a wide variety of PTG in the current sample. The PTG mean in this study was above mean scores recorded in other cardiac populations ($M=50.58$, $SD=23.50$; Leung et al., 2010) indicating a high degree of PTG in this sample.

Grounded theory analysis

Stage 1 (pre-CABG): shattering of identity assumptions. Theoretical sampling was evident as the interviews progressed, dividing participants into two groups (refer to Figure 1): Group A experienced severe chronic heart symptoms before the surgery and identified as being 'ill' prior to the surgery, while Group B was either asymptomatic or experienced acute heart symptoms and identified as being 'healthy' prior to the surgery. All participants indicated that the shock of finding out that they needed the surgery was the most traumatic part of the experience, rather than the surgery or complications after the surgery. The distress of needing surgery and/or diagnosis is consistent with the work by Doka (2009), who identified the time of diagnosis of a life-threatening illness as a shock because the patient is faced with mortality and identity crises. Across both groups, indications of intrusive worries and ruminations were evident upon hearing that the CABG was needed, with the dominant worry being concern about possible death and a dominant rumination being experiencing the 'awful shock' when informed about the need for the CABG. Evidence of intrusive worry and ruminations in the immediate aftermath of trauma is consistent with the PTG model (Calhoun and Tedeschi, 2006).

Symptomatic pre-CABG (Group A). Group A identified as 'ill' prior to the surgery and was restricted by the chronic heart symptoms pre-CABG. The patients had accommo-

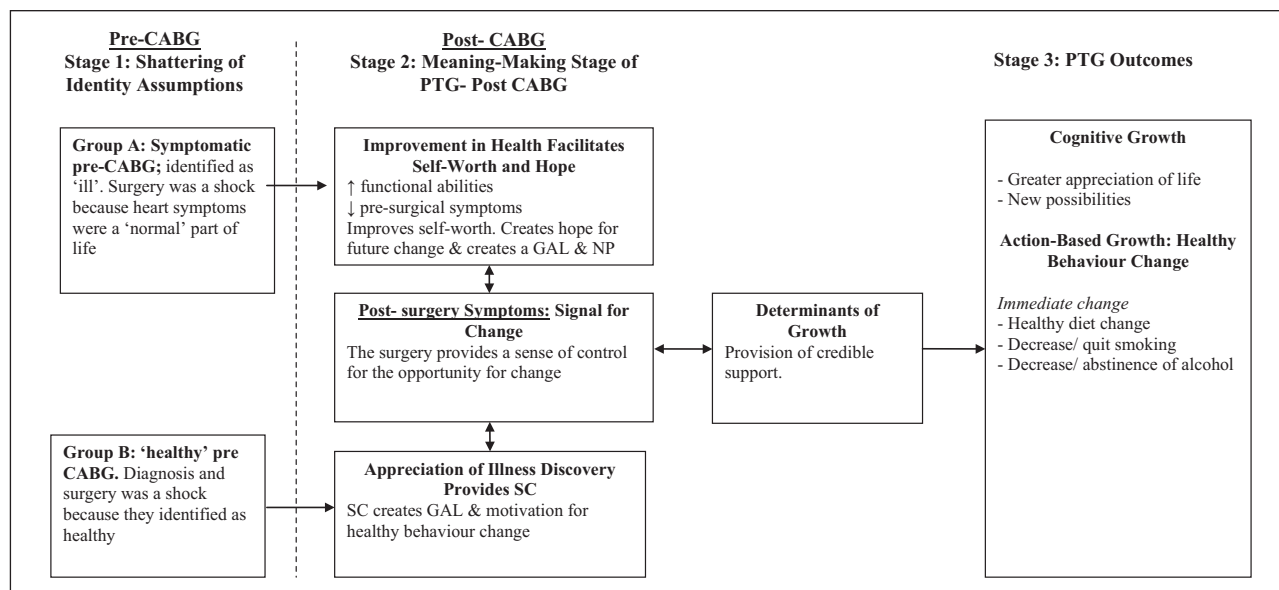


Figure 1. Model of the PTG process in post-CABG patients.

CABG: coronary artery bypass graft; GAL: greater appreciation of life; NP: new possibilities; PTG: posttraumatic growth; SC: second chance.

dated and assimilated these chronic symptoms and the resulting restrictions (e.g. pain, reduced independence) into their life as 'everyday occurrences', thus creating an identity based on the 'sick role'. Being informed of the need for surgery was therefore a shock to them as it meant that they were more ill than they considered themselves:

My angina was very limiting before the surgery ... I was in and out of hospital every week ... The pain [referring to the pain of the angina] stopped me doing things I wanted such as visiting family, and really I stopped myself, I just didn't want to face going out, face things you know ... but finding out that I needed a triple bypass; well I wasn't expecting that because I don't know I had felt like that for so long. When I found out I cried yeah ... I was scared shitless, I didn't want to die, not yet ... (P8)

Healthy pre-CABG (Group B). Group B self-identified as healthy with few health limitations before surgery. The majority of this group experienced sudden onset of cardiac symptoms, seven of whom underwent an emergency CABG. The diagnosis and subsequent surgery were incongruent with their healthy identity:

Well I have to say finding out that I needed a bypass was a surreal experience, such an awful shock. I never thought I would need to go through anything like this ... the CABG surgery I mean. I've lived a relatively active life – I grew up playing sports and athletics and now I play bowls and go for frequent walks ... (P12)

Stage 2 (post-CABG): meaning-making stage of PTG. Patients started to make sense of the need for the surgery in the post-CABG period, outlined in Stage 2 of this model (refer to Figure 1). The meaning-making stage of the PTG process

revealed distinct and shared stages for both groups. Across groups, nearly all participants ($n=13$) agreed that the surgery was an important part of re-building their identity assumptions. Where the groups differed was that Group A put more meaning on the decrease in pre-surgical heart symptoms and increase in functional abilities, while Group B emphasised the importance of appreciation of illness discovery and the avoidance of further worsening of CHD symptoms and underlying pathology. The majority of the meaning-making process appeared to take place post-surgery which was consistent across both groups. Evidence of meaning-making on the post-surgical stage is consistent with the research on deliberate ruminations in the PTG model (Calhoun and Tedeschi, 2006). The deliberate rumination stage is noted as a core element of being able to rebuild one's self-view because distress related to the traumatic event starts to resolve as meaning is restored (Triplett et al., 2012).

Distinct pathways

Improvement in health facilitates self-worth and hope (Group A). All patients in this group made frequent reference to the relationship between improvement in physical functioning since the surgery and an improvement in positive emotions. Patients discussed that the improvement in positive emotions was connected to an improved sense of 'self-worth'; self-worth being defined as feeling more useful and being able to do activities that were restricted to them pre-CABG. The meaning found with the improvement in self-worth facilitated the last stage of this model (refer to Figure 1): a sense of hope for new possibilities and a greater appreciation of living day-by-day:

All I can say is that this is great [pointing to heart]. I've been going under the house since I got back to my house and doing stuff with timber whereas before I couldn't really cause I used to get so breathless ... I never rouse at people anymore, I just feel better about myself since my breathing has improved; ... better breathing has really made me appreciate the surgery and just life in general, ... so who knows what I might be able to do when my fitness returns ... (P10)

Appreciation of illness discovery provides a second chance (Group B). The restructuring of shattered 'healthy identity' assumptions was facilitated by the realisation and appreciation that the surgery helped avoid the health deterioration that would have occurred if they did not have the surgery and gave them a second chance in life. The perception of surgery as a second chance is consistent with the findings by Lindsay et al. (2000). The current findings indicate that differentiating between asymptomatic versus symptomatic patients prior to surgery is essential because of the different experiences of the recovery process as outlined in Figure 1.

The appreciation of CHD discovery and the realisation that the surgery has provided a second chance in life facilitated Stage 3 of the model (refer to Figure 1): motivation to lead a healthier lifestyle to avoid future complications and appreciate the value of life. This link between diagnosis appreciation and motivation of growth is consistent with the findings by Leung et al. (2012), who concluded that perceived risk of future health problems commonly instigates PTG:

... I just thought that I could have died or become really ill without realising I didn't have anything wrong with me and that really scared me. But then I thought 'gee I'm so glad that they found it, I'm really lucky because I have another chance here'. Just knowing that I have a second chance, well ... I have this positive attitude and appreciation for everything now and I want to change my life ... be healthy ... (P2)

Shared pathway: post-surgical symptoms

Signal for change. The post-surgical symptoms of the surgery were a part of the meaning-making process shared by both groups as the symptoms signalled to the patients that the CABG was necessary in order to decrease the likelihood of future CHD deterioration and extend their longevity. All patients but one (P13) reported that they were able to cope with the short-term cardiac symptoms including frequent reports of chest pain. These patients acknowledged that the post-surgical symptoms were a short-term cost needed for long-term gain. This perspective was consistent across both groups:

Ahhhh the benefits [of the surgery] have been pretty quick to realise, so my future is looking so much better ... I'm starting

to feel a lot more in control ... even though my chest hurts like hell it's ok because I can finally breathe ... (P5, Group A)

... It [referring to the limits of short-term recovery] probably affected my male ego a bit [laughing] ... I mean it's frustrating when I go shopping and firstly I can't drive and then I can't carry my own bags but it's been ok ... I realise that what I do in the short term will impact on my next 6 plus months ... (P11, Group B)

The interpretation of post-surgical symptoms as a signal for change is similar to one of the key findings identified in a meta-analysis that pain was a cue for patients which helped progress to normality (Leegaard and Fagermoen, 2008). Progress along the meaning-making pathways was important for the patients in order to achieve the last stage in this model: PTG. However, the degree of PTG in this sample was determined by two moderators: the 'primary reference group' and 'optimism'.

Determinants of the strength of growth. The data revealed a potential moderator of strength of growth as being the primary reference group and optimism.

Provision of credible support. The meaning-making process is facilitated through shared experience of someone who has also gone through the CABG. Nearly all participants ($n=13$) reported discussing their experiences and expectations of recovery in the long-term with another person who had also undergone the CABG procedure. The majority of the primary reference group was a family member, friend or another inpatient they met in the immediate recovery period. Having someone who understood what recovery from a CABG surgery entailed reassured the patient that their recovery progress was 'normal' and relieved any distress about the recovery. Additionally, the support provided by the primary reference group helped the patient realise the positives of the surgery, including a 'greater appreciation of life' and healthy lifestyle change. The importance of support from people who have also undergone the CABG in facilitating positive outcomes is consistent with previous research (Backstrom et al., 2006; Lindsay et al., 2000):

... Well it [the post-surgical recovery period] was pretty hard ... nobody understands what you've been or going through, if they haven't been through it themselves ... luckily my dad has gone through it and my brother so I thought 'if they can get through it, I can' ... my brother's support has been good as it reassures me that I'm not abnormal, that there is nothing wrong with me ... also to see him get through it even with all this pain that I'm going through at the moment, well it reassures me that it [the surgery] will all be worth it in the end ... (P14, Group B)

One participant indicated no support from a previous CABG patient. This participant indicated greater difficulty processing the meaning for the surgery:

Yeah it might have been a good idea to talk to guys who had undergone the surgery to have given me a bit of a clue about what to ruddy expect after this surgery. Aside from not knowing practical things like taking tablets regularly ... I don't know maybe talking to someone who had been through this heart operation before might have made it [referring to the recovery period] easier for me ... (P13, Group B)

Stage 3: PTG outcomes. The outcomes of PTG in this sample were manifested in two broad categories: cognitive growth and action-based growth. These two categories of PTG are discussed in more detail below.

Cognitive growth. Patients indicated change in two dimensions of cognitive PTG: appreciation of life and new possibilities.

Greater appreciation of life. The majority of participants in both groups agreed that appreciation of life increases the importance of 'living in the moment' rather than looking too far into the future. Increased appreciation of life in post-CABG patients is consistent with the research in acute MI/CABG patients (Bluvstein et al., 2013):

I'll try and squeeze more out of life; because you don't appreciate it until you find out you might not be here in the morning you know. So you squeeze into much in the day as you possibly can ... once you are gone you can't come back and that has definitely kick in since finding out I needed the surgery (P5, Group A)

I can't look into the future ... One day at a time and appreciate the now I suppose ... since the surgery I've really come to realise the importance of appreciating life right in the moment because you never know what's going to happen, so I just take it how it comes ... you jump the hurdles when they come (P7, Group B)

New possibilities. The majority of participants also acknowledged that the surgery has given them an opportunity to make changes in their life. The opportunity for change was also found in Bluvstein et al.'s (2013) sample of acute MI/CABG patients, with a positive relationship found between stress symptoms related to the cardiac experience and a greater sense of 'new possibilities' in the recovery period:

Since the surgery it has made me realise that I have been presented with an opportunity to change. It [referring to the surgery] has given me more confidence and has given me the tools to make the most of this opportunity; I feel better equipped ... (P11, Group B)

However, Group A referenced more appreciation of increased independence in providing new possibilities due to improved functional abilities compared to functioning pre-surgery:

... The surgery has given me new lease of being able to do things in a way I wasn't able to before. (P4, Group A)

Across groups, patients indicated that while they believed that the surgery had given them an opportunity for change, few commented that they had or were planning to develop new interests. Rather, participants indicated that the diagnosis and surgery had provided them with an opportunity and motivation to engage in new possibilities for healthy behaviours to improve surgery outcome and avoid the risk of future CHD symptoms. While most participants had already made some health behaviour changes, most also continued to express recognition of new possibilities for further health behaviour change in the future. Although many patients also acknowledged the importance of exercise change, most identified that they have not yet made those changes because they are still restricted physically by their recovery:

I'm now intent not to let my weight get up again by eating healthy but importantly doing more exercise. I haven't been able to go the gym yet because I'm still recovering but I definitely want to and will once I can ... I'm not going to go to the gym and go crazy and do so many push-ups, simply just do exercise that I want and eat well. The difference is that I want to do more now, the surgery has given me that (P12, Group B)

Action-based growth: healthy behaviour change. It is necessary to distinguish between opportunities for change outlined by the domain of 'new possibilities' in the PTGI and action-based changes described in this section to decrease the ambiguity of PTG as an illusionary construct as suggested by a number of authors (Hobfoll et al., 2007; Taylor et al., 2000; Zoellner et al., 2008). That is, the construct of 'new possibilities' refers to a cognitive state of considering health behaviour changes in the future, as opposed to action-based growth that refers to actual behavioural changes already occurring. Inclusion of action-based growth as a component of PTG in this sample also starts to help close the gap in the lack of research of action-based growth (Pat-Horenczyk and Brom, 2007; Tedeschi et al., 2007; Wagner et al., 2007; Westphal and Bonanno, 2007).

Nearly all participants ($n=13$) identified immediate healthy behaviour changes that they had made since the surgery for two main reasons: (1) to avoid the risk of developing future CHD symptoms and (2) make the most of the opportunity the surgery has given them to improve their health and life in general. The healthy behaviour changes were consistent across both groups, even though Group B identified as 'healthy' before the surgery, this group identified similar desires to improve healthy lifestyle. Post-surgical limitations (e.g. decreased mobility) did not appear to impact involvement.

Diet changes.

Yeah I don't eat takeaway every night of the week anymore ... I'll have fish, and I love battered fish, but now I have mine grilled with salad ... I'm eating so much rabbit food now but it's because I now understand how important it is to look after myself. (P6, Group B)

Alcohol intake changes.

No greater epiphany but a classic wake-up call ... So really it [the surgery] has given me an incentive to look after myself in my immediate future ... There is nothing stopping me from going to Dan Murphy's and getting pissed but I just don't want to anymore. I would rather just drink and enjoy one glass of good wine ... It's important to me to do this now because it's about taking the opportunity to better my life as I have now. (P11, Group B)

Smoking changes.

I've also given up smoking. Since the surgery I haven't smoked. I was never a heavy smoker ... I could go days without smoking anything, and then smoke 3-4 cigarettes a day. I don't want to keep smoking because it's not good for my health. I've definitely realised that after the surgery. (P9, Group B)

Interaction between cognitive growth and healthy behaviour change. Patients reported a bi-directional relationship between cognitive growth (specifically the new appreciation for life) and healthy behaviour change (refer to 'Stage 3' in Figure 1). The surgery has given the patients an appreciation of life and one way to value life is to look after it by living a healthy lifestyle. The interaction between the parallel relationship between cognitive growth and behavioural growth was also evident in the following quote:

And now I'm thinking that I'm so much better that I have this positive attitude and appreciation for life now I suppose ... I want to change my life: change the way I eat, change the way you know my attitude towards life and now I think 'yes I am going to live' ... Yes I feel very positive. I'm really happy, really happy to be here. (P2)

The relationship that emerged between cognitive and action-based growth is consistent with the concept of an action-based component to the PTG model (Hobfoll et al., 2007).

Limitations

Consideration must be given to the type of patients attending the outpatient clinics. According to Leedham et al. (1995), patients who regularly attended rehabilitation services are more likely to be health conscious individuals and have positive expectations about recovery. Thus, participants in this

study may have been predisposed to interpret the surgery as a positive. Therefore, caution must be taken when generalising to the greater CABG population.

All but one of the participants was male. The female participant alluded to being more appreciative of her family since the CABG, while most males noted a general awareness of family support. However, the male-biased ratio in this study precludes gender comparison of PTG which should be explored in future studies. Finally, while we appeared to reach a saturation of themes due to no new constructs being expressed by the final participants, the study did involve a relatively small sample size. While qualitative studies such as this one are aimed at being inductive, that is hypothesis generating, we still need to be cautious about developing hypotheses based on different sub-groups with such a relatively small sample size.

Implications

This study was unique in that it compared the recovery experiences of patients who had suffered from long-term chronic heart symptoms prior to the surgery and individuals who were mostly asymptomatic, many who required an emergency CABG. To the best of our knowledge, no such study has compared the recovery experiences from the perspectives of these two groups. Future research should test whether patients who were symptomatic versus asymptomatic prior to CABG surgery do have different meaning-making processes and whether these processes can be facilitated separately in order to promote PTG in these groups. This would allow more tailored interventions that may have stronger effect sizes that using a more generic PTG intervention for all post-CABG patients. In addition, there were indications of the importance of peer interaction as a facilitator of recovery moderating patient's perception of control over the short-term recovery period and overall action-based growth (e.g. information about foods to avoid, ensuring a healthy heart). Evidence of action-based healthy behaviour change is encouraging for improvements in long-term recovery. In addition, a longitudinal analysis of behaviour change among post-CABG patients is required to determine whether growth stimulated by the surgery is long-lasting. Results from Tolmie et al.'s (2006) study suggest patients had difficulty maintaining healthy behaviour change after a 7-year period. It would therefore be of interest to examine whether the degree of PTG following CABG is associated with the degree of long-term behaviour change. Finally, future research should explore whether both the degree of exposure to and the quality of support given by a primary reference group member who had prior experience with CABG does in fact facilitate the development of PTG in this population. If so, then future interventions should encourage access to such support as a core aspect of the intervention.

Conclusion

This study explored both the experience of PTG in post-CABG patients as well as the factors that may influence the development of PTG in post-CABG patients. The characteristics of PTG in this sample were identified in Stage 3 of the results/model. That is, PTG in this sample involved both cognitive growth and action-based growth. Cognitive growth involved both a greater appreciation of life as well as a recognition of new possibilities for health behaviour change. Action-based growth involved immediate improvement in health behaviours post-CABG.

The factors proposed to influence the development of PTG in this sample were identified in stages 1 and 2 of the results/model. That is, the separate processes of meaning-making experienced by patients who were symptomatic versus asymptomatic prior to CABG surgery both resulted in a signal for change. The group that was symptomatic before CABG interpreted the improvement in functionality and the decrease in symptoms in terms of improved self-worth and improved hope for future change. The group that was not symptomatic prior to the CABG interpreted the period following the CABG in terms of an appreciation for the discovery of an underlying illness and saw the CABG as providing them with a second chance at life. As such, both groups viewed the CABG as a signal for change. A moderator of the strength of growth was the experience with the participants' primary reference group. Growth appeared to be stronger in participants who had a friend or family member who had credibility due to previous experience with CABG who could reassure them that their progress was normal, relieve any distress about recovery and provide support by helping the participant realise the positives of the surgery. The greater the exposure to such a person and the more of such support provided, the greater the PTG. Overall, the model of PTG developed in this study may be helpful in guiding future research into developing more tailored interventions to promote PTG and behaviour change in CABG patients.

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Declaration of conflicting interests

The authors declare that there is no conflict of interest.

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